Thomas Anderson

PANTHER

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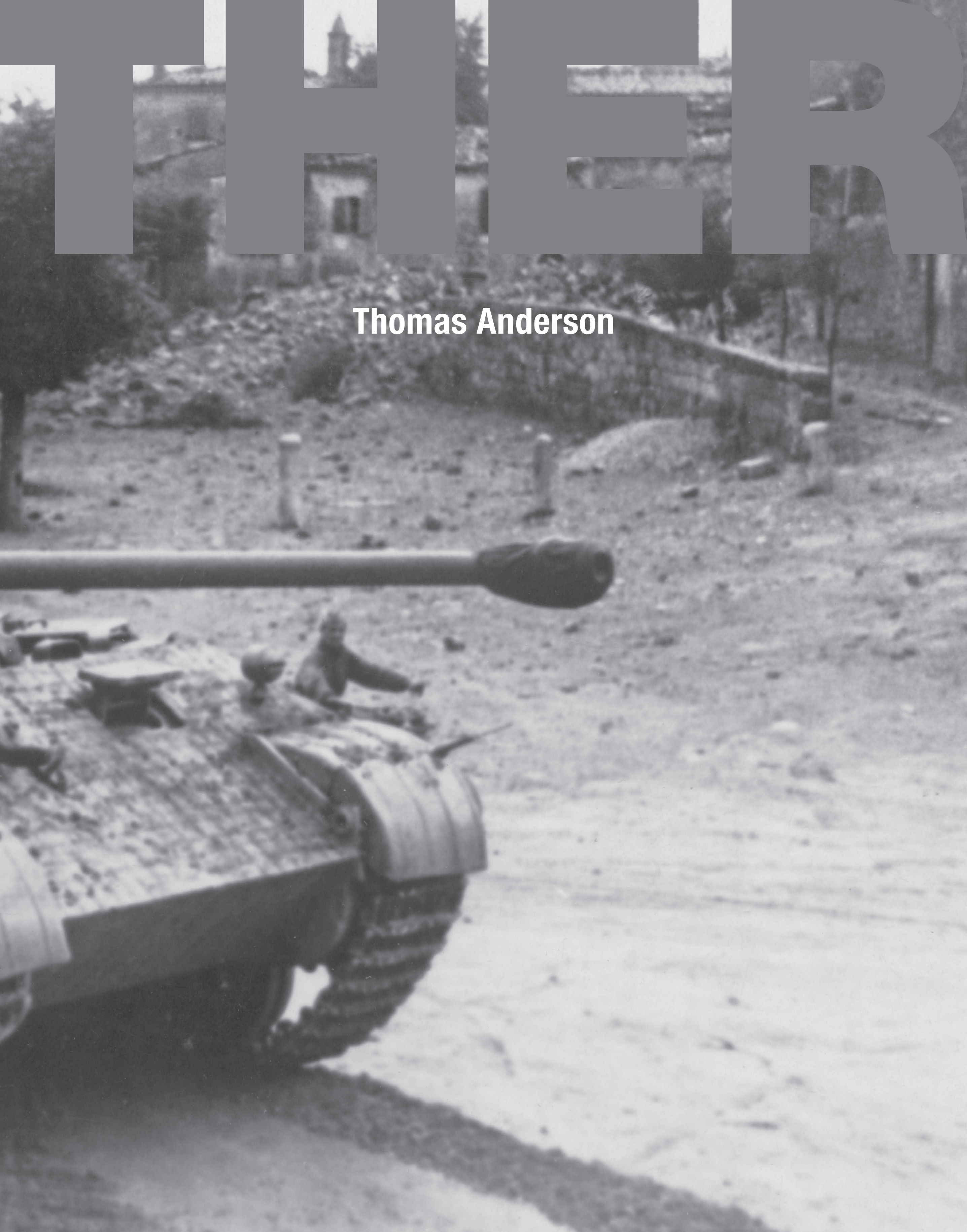

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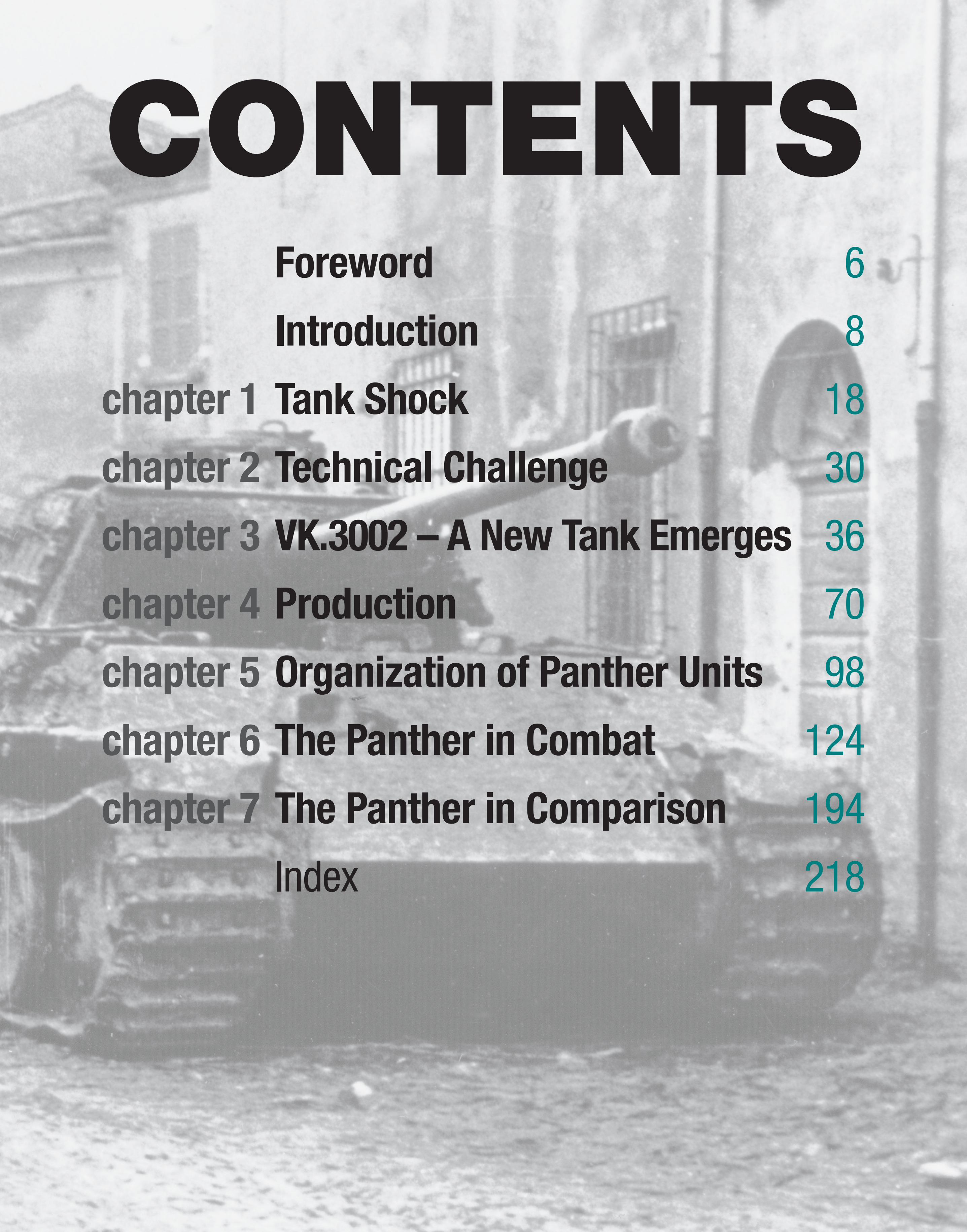
This book is dedicated to the late Thomas L. Jentz, guiding spirit in our research.



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Foreword

This book details the *Panzerkampfwagen* (PzKpfw) V Panther medium tank, from concept through design and development, to production while the German armaments industry was under continuous attack by Allied bombers. When the type entered service it was deployed against Allied forces in the west; the last desperate offensives against the Red Army in the east and the bitter fighting in defence of the Fatherland.

The PzKpfw V Panther represented a new pinnacle in tank design in World War II, as the Soviet-built T-34 had done in 1941. From 1943, the Panther pushed forward the limits of the three fundamental factors: firepower, mobility and armour.

From the beginning, *Generaloberst* Heinz Guderian – the 'Father' of the *Panzerwaffe* – proposed that the technical specification and tactical capability of the Panther were to synchronize perfectly with his concept of a Panzer division. The same divisions, which with simple pre-war equipment had conquered large parts of Europe.

The designers were required to create a tank. After great initial difficulties a vehicle resulted with extraordinary specifications and which, reduced to its achievements both technical and tactical, was superior to all enemy tanks from then to the end of the war.

The combination of high mobility, an effective main gun and good armour pointed the way forward into the post-war period.

This book may bring the essential character of the medium tank closer to the reader and answer questions. Can often superficial evaluations withstand critical examination?

Thomas Anderson
Spring 2017

A PzKpfw V Panther of I./PzRgt 4 crossing a river bed in Italy at slow speed. The crew has fixed a box across the rear, a valuable place for stowing rations and personal belongings. The driver's hatch is wide open – apparently enemy contact was not expected. (History Facts)

Introduction

Summer 1941. The appearance of a modern Soviet tank, the T-34, came as a complete surprise and put paid to the current developments and future plans of the German armaments industry. A new beginning was called for. In 1942, under dramatic circumstances, the development began of the PzKpfw V Panther; possibly the best main battle tank of the World War II.

The Eastern Front

The war began at 05:45 hrs on 1 September 1939, when German forces invaded Poland. On 10 May 1940, The Low Countries were invaded as a prelude to the invasion of France. By 14 June, German forces were parading through Paris and an armistice was signed on 22 June, leaving northern Europe occupied. On 21 July 1941, *Unternehmen* (Operation) Barbarossa was launched against the Soviet Union, opening a new stage of the war. While a rapid victory appeared very achievable during the summer months, the arrival of the heavy rains of autumn and then severe frost and snow of winter destroyed all ambition. Battle-proven German forces, and above all units of the *Panzerwaffe*, who had become accustomed to victory, were halted at the gates of Moscow.

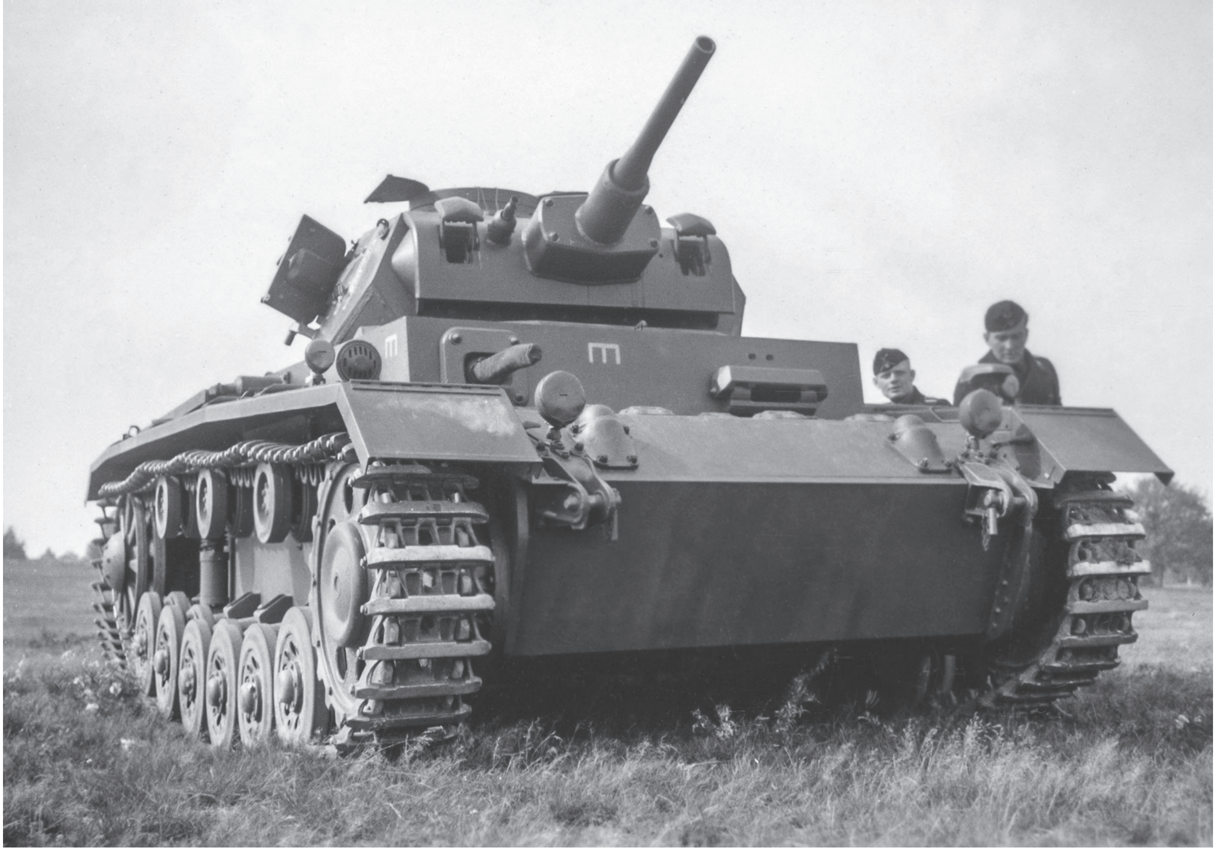
In the months before the invasion, the *Panzerwaffe* had been experiencing a phase of changes to organizational structure and equipment inventory.

Photographed on the 15th Panzer Division training area in Sagan, Silesia this excellent view of a Panther Ausf D, shows all the power and grace of this superb tank. The 75mm KwK42 L/70 gun was extremely lethal, being able to penetrate 88mm of armour plate at 2,000 metres. (Panzerfoto)

1941 – The Initial Situation

A document from 3.PzGruppe, dated 10 May 1941, describes the problems of this adjustment:

I. 'Old' Panzer Divisions
1.) The combat units of 7.PzDiv are in, or are being brought into, good order.



By June 1941, most PzKpfw III (here an Ausf G) were fitted with the 5cm *Kampfwagenkanone* (KwK – tank gun) L/42. By firing the strictly rationed tungsten-core PzGr 40 shell, the gun could penetrate 55mm thick armour at 500m, hardly sufficient against Soviet tanks of the time. (Anderson)

> Recently returned from France for general maintenance, 7.PzDiv still has a large number of vehicles at workshop units for major overhaul. Therefore it has, at this time, only limited mobility.
>
> II. 'New' Panzer Divisions
> 2.) All of the Panzer regiments in the new tank divisions are well equipped.
> 3.) The artillery is equipped with an adequate number of armoured command vehicles.
> 4.) The equipping of the infantry regiments does not meet with requirements. There is worrying lack of armoured vehicles.
> 5.) Two weeks ago, 19.PzDiv received a large number of vehicles for their infantry units... but the number is so small that still they have to operate with the vehicles of various other units for exercises.
> 6.) As a temporary measure, 20.PzDiv is being equipped with captured French types... but training time still remains very limited.

The document confirms that the situation within German tank divisions shortly before Operation Barbarossa was far from satisfactory. Whereas organizational problems could be easily be solved, the German armaments industry did not

Tanks of 9.PzDiv during the Balkans campaign. A few weeks later the unit was sent to fight in the Soviet Union. At the time, it was equipped with 11 PzKpfw III Ausf Es armed with the 3.7cm KwK L/45 which, like the PzKpfw II, could defeat earlier Soviet tank types. (Anderson)

have sufficient production capacity to supply the required numbers of tanks and armoured troop carriers for the campaign. In May 1941, the situation for the supply of new tanks was as follows:

The PzKpfw I was specifically developed to supply the tank divisions forming in 1933, but was totally obsolete as a fighting vehicle by 1941; it was then used as an auxiliary vehicle.

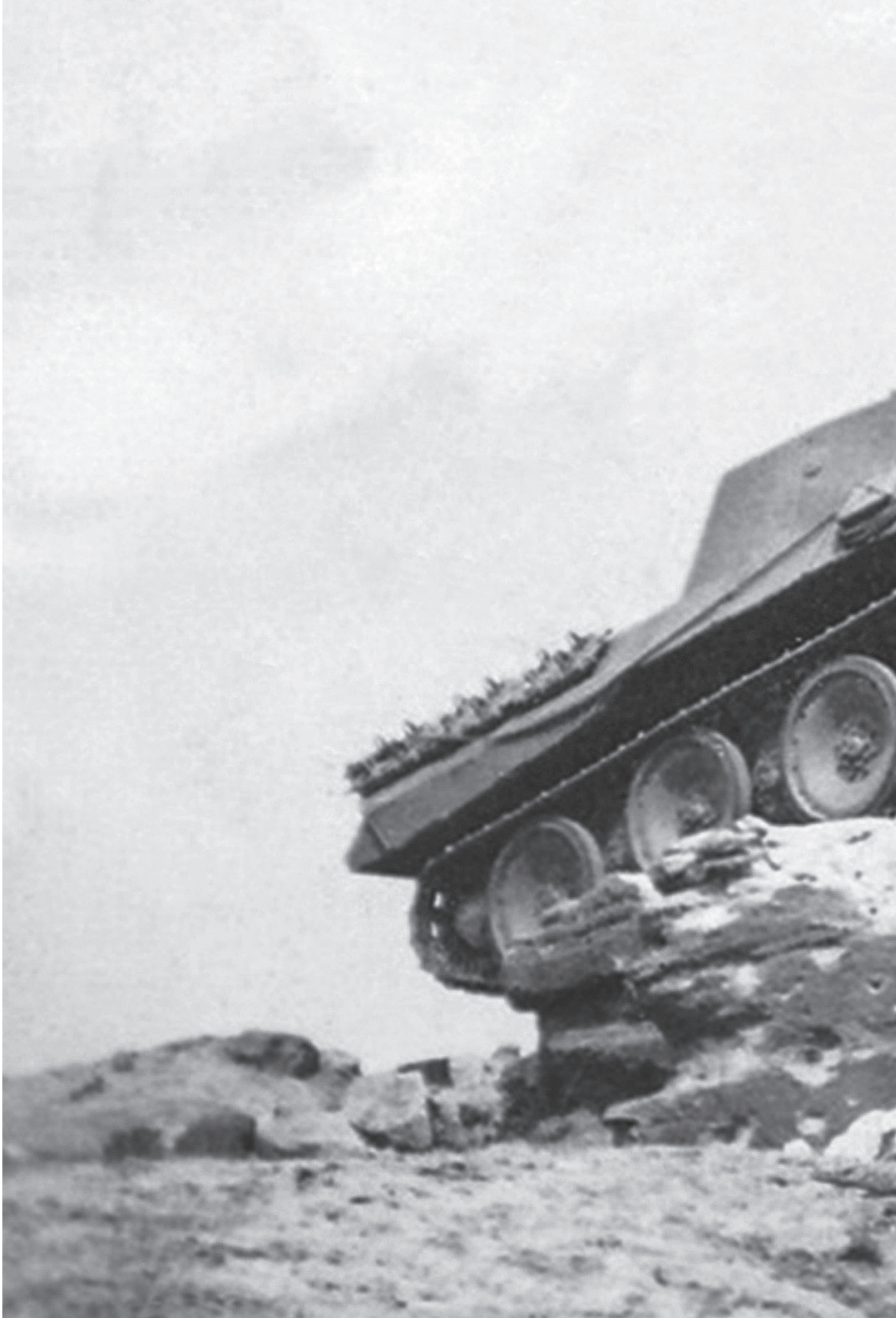
The PzKpfw II remained in use with staff companies at regimental and battalion level, and also as a reconnaissance vehicle with light platoons of tank companies; it was also considered obsolete.

PzKpfw III and IV were operating in the role for which they had been designed and some 1,400 were in service.

The PzKpfw III fulfilled the role of main battle tank being deployed for fast thrusting attacks in tank-versus-tank combat. Initially it was armed with a 3.7cm *Kampfwagenkanone* (KwK – tank gun) L/45; the same gun and ammunition was used by German anti-tank units: a logistical advantage.

The PzKpfw IV armed with the 7.5cm KwK L/24 served *Panzerabteilung* (PzAbt – tank battalion) as a support vehicle to cover the advance by a light tank company. The very effective high-explosive (HE) fire would be used to eliminate enemy anti-tank guns, artillery positions and machine-gun nests.

A production PzKpfw V Panther Ausf D mounting the long-barrelled 7.5cm KwK 42 L/70 balanced on a rocky outcrop. (Anderson)



German forces were equipped with a large number of type PzKpfw 38(t) – *tchechoslowakisch* – light tanks manufactured in Czechoslovakia but were of limited fighting value. (Anderson)

Early PzKpfw IV were poorly armoured which only gave protection against light and medium infantry weapons, but when mass production of the type began in 1940, frontal armour was increased from 14.5mm to 30mm.

The French campaign showed that the 3.7cm KwK L/45 mounted in the PzKpfw III was virtually ineffective against the armour on French medium and heavy tanks, and as a consequence it was decided to use the 5cm KwK L/42 gun. From July 1940, all production PzKpfw III mounted the heavier gun and earlier tanks were to be re-fitted as soon as possible. The operational usage of the PzKpfw IV was never in question, and all production tanks continued to mount the 7.5cm KwK L/24.

Even if German tank battle tactics of the1930s placed mobility above armour protection, only after the successful conclusion to the campaign in France was the need to increase armour thickness admitted. However, this had been planned before the Polish campaign as noted in a document, dated 25 October 1939, from the *Waffenamt* (weapons office):

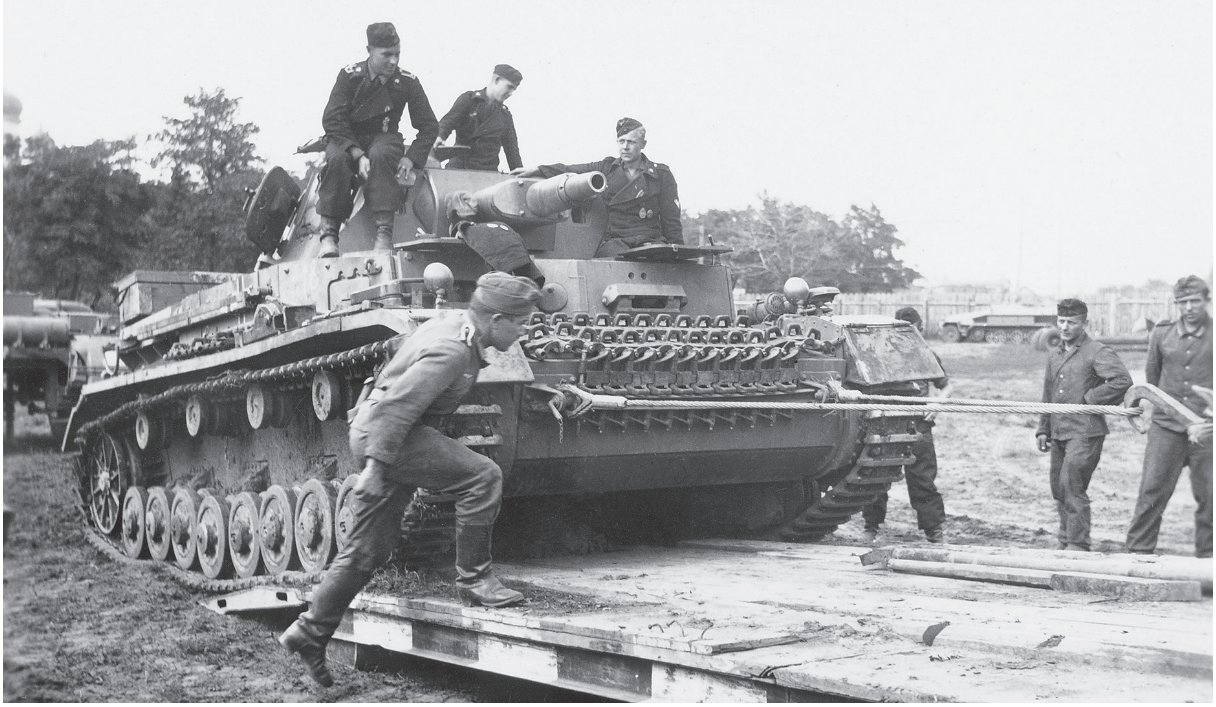
> To C-in-C *Panzerwaffe*:
> a.) Additional armour; it is only possible to fit this on the upper part of the hull front, not on the turret front.
> b.) Strengthening of the glacis during the production of a new series is certainly possible, but no decision has been made over the upper face [driver's position], and not at all on the face of the turret (extra frontal weight has an adverse effect on cross-country

> mobility). Furthermore carrying out up-armouring work cannot begin before 1941, but by then the PzKpfw VI will be established in series production. [The designation PzKpfw VI does not refer to the later Tiger Ausf E, but the *Durchbruchwagen* (Dw – breakthrough vehicle) a heavy tank planned in 1937. Author].
> The *Waffenamt* therefore suggests:
> a.) To fit additional armour to the glacis plate.
> b.) To fit additional armour to the hull upper wall.
> No reinforcement to the front of the turret.

In 1940 and 1941 numerous PzKpfw III and IV were fitted with additional riveted-on armour to increase the frontal armour to 50mm or 60mm. On all production (PzKpfw III *Ausführung* [Ausf – model/version] J, PzKpfw IV Ausf E and F) the frontal armour was increased generally to 50mm. Each light tank company was allocated 17; between 70 and 100 were required to equip all Panzer divisions operational in 1941.

The PzKpfw III and PzKpfw IV were both designed for deployment in Western Europe where the landscape and good roads provided excellent conditions for armoured operations. All German tanks were fitted, as standard, with highly-efficient radio equipment which allowed a company commander to direct the tanks in his unit during combat.

Command tanks, fitted with high-powered radios, allowed contact with command echelons and the *Luftwaffe*. Additionally all German tanks were fitted with excellent gunsights and other gunlaying optics.



All PzKpfw IV A to D mounted the short-barrelled 7.5cm KwK L/24. The PzKpfw IV Ausf F (later F1) mounted a 7.5cm KwK L/43, but neither gun was powerful enough (except at close range) to defeat the more modern Soviet tanks entering combat. Here pioneers load a damaged Ausf D on a *Sonderanhänger* (SdAnh) 116, the standard low-loading recovery trailer used by all tank units. (Münch)

In 1941, the T-26 infantry tank was numerically the most important in service with the Red Army. The type was developed from the the British-built Vickers 6-Ton light tank, and the Soviets produced some 11,000 in variants. But by 1940 the T-26 was obsolete. (Anderson)

The Russian Side

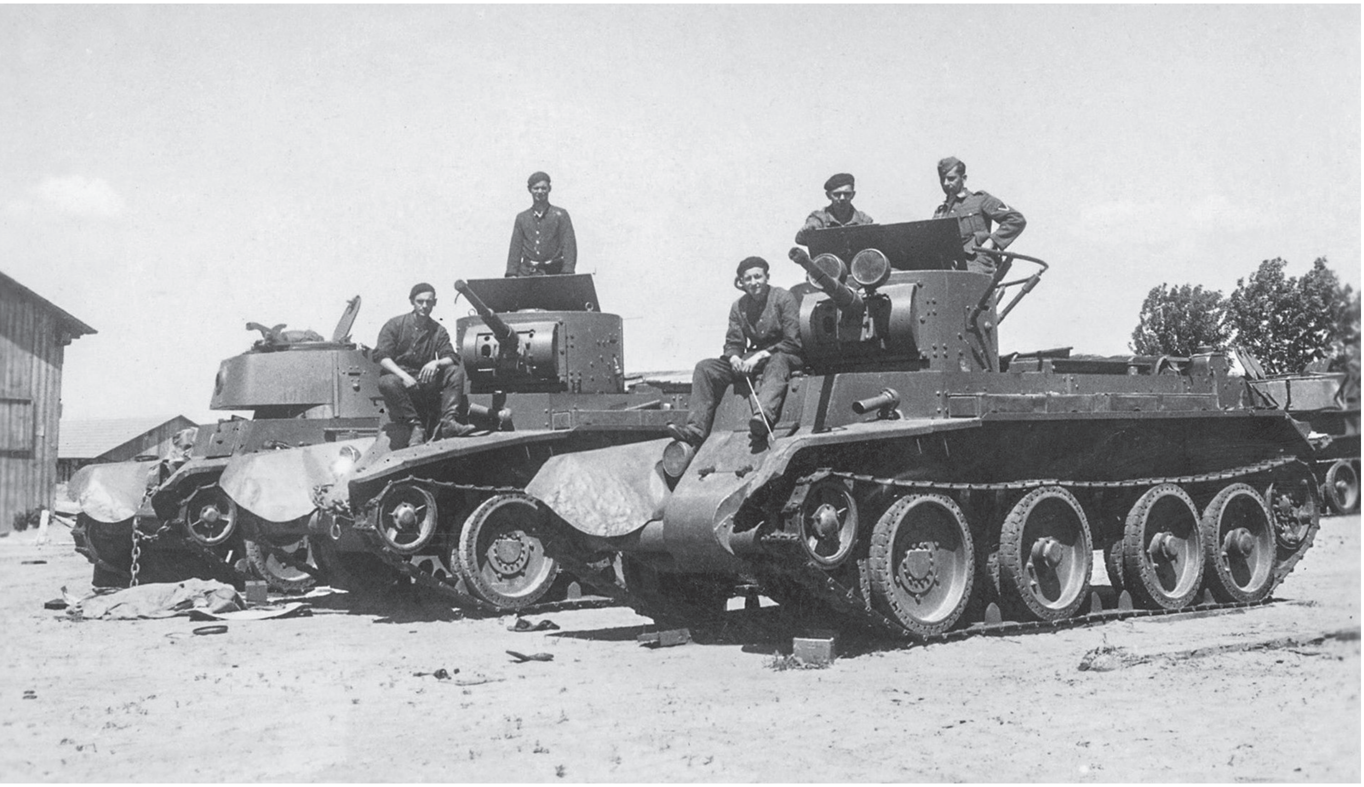
Before the invasion, German military planners had under-estimated the numerical superiority of Russian armoured forces. The 'Foreign Armies East' office had based its figures on the results of aerial-reconnaissance flights, but these had missed several vital areas.

Russian tank strength Barbarossa, June 1941

Type:	T-27	T-26	BT-5 BT-7	T-35	T-28	T-34	KV-1	KV-2	**Total:**
	3,110	9,686	7,502	61	503	1,244	424	213	22,743

German tank strength Barbarossa, June 1941

Type:	PzKpfw I	PzKpfw II	PzKpfw III 3.7cm	PzKpfw 35(t)	PzKpfw 38(t)	PzKpfw III 5cm	PzKpfw IV	Pz Command vehicles	StuG	**Total:**
	152	743	259	155	394	707	439	167	200	**3,216**



Based on the M1931 ‘convertible tank’ design by US tank pioneer J. Walter Christie, the Soviets developed the BT-5 and BT-7 (in the background) fast light tanks. Large numbers entered service but were no match to the firepower of German tanks. (Anderson)

In the 1930s, there had been a certain level of technical cooperation between the German Reich and the Soviet Union; apparently the Germans were aware of all Soviet current tank types and were satisfied that the quality of their tanks seemed far superior. In return Hitler had ordered that the Soviet delegates were to be allowed unrestricted access to German tanks and the *Luftwaffe*. It is reported that the Soviet military protested during inspections at German armaments factories that they were not allowed to see everything. The Germans were surprised to receive these complaints and could not understand the distrustful attitude. The reason behind it was that the Soviets were not honest about their own tank developments and had expected the Germans to act in a similar way.

By 1941 the era of this mutual cooperation had ended, and the long-planned Operation Barbarossa was ready to be launched. The table on page 16 (assembled from Russian documentation) shows that Russia had more than 20,000 tanks available at the time of the invasion.

The *Oberkommando der Wehrmacht* (OKW – high command of the military) had for some time been aware of this numerical superiority, but was confident that German tanks were far superior to the known Soviet types. The fighting ability of the Red Army was also poorly underestimated and the OKW remained convinced that it would quickly be overwhelmed by battle-hardened German forces.

Tank Shock

1

A short time after the onslaught of Operation Barbarossa, German forces were faced on the battlefield by more modern Soviet battle tanks such as the T-34 and KV. At first these appeared in small numbers, but were always poorly deployed by tactically-inept commanders. However as the invasion progressed, they appeared in increasing numbers and provided a serious threat to German forces. The sight of these apparently unstoppable tanks to Germany infantry, already having to contend with mud and bitter cold, was frightening and many abandoned their positions.

Operation Barbarossa

On 22 June 1941 the attack began; German Panzer divisions had over 3,000 tanks, including some 1,000 PzKpfw I and PzKpfw II which had little combat value. Also there were 700 PzKpfw III mounting the 5cm KwK L/42 gun, and 440 PzKpfw IV and 200 StuG assault guns, both armed with a 7.5cm gun.

The initial expectations of the German military planners were fulfilled, as many units of the Soviet defenders proved incapable of stopping the advance. Even the German light tanks (armed with 2cm and 3.7cm guns) proved to be effective against Soviet T-26 and BT-series tanks.

A further factor that contributed to the absolute superiority of German battle tactics was the many purges by Stalin against his experienced military high command which had left the Red Army decimated. Led into battle by incompetent political commissars, many of whom had no military training, the defenders suffered devastating losses. For German forces, victory seemed to be within their grasp.

However, history shows that despite the massive territorial gains by the Germans and the colossal number of Soviet casualties, the ambitious time schedule, set by Hitler, could not be kept. One reason was the brave (and

The main feature of the Russian-designed T-34 was a hull fabricated from welded sloping armour plate and wide plate-type tracks. Neither German tank nor anti-tank guns could defeat this type of armour. Here German troops inspect a T-34 which has crushed a *leichte Feldhaubitz* (le Fh – light field howitzer) 18. (Anderson)

The Red Army had a series of light tanks in its inventory which they used for a number of purposes, from reconnaissance to the transportation of spare parts and fuel to front-line units. Here a T-60 has been hit and caught fire during street fighting in Kharkov. (Anderson)

sometimes fanatical) resistance by the Soviets; another was the supply problem caused by the rapid advance which was to be made even more difficult due to the unpredictable climatic conditions of such a vast country. Also of equal significance was the appearance on the battlefront of two tank types of a much more modern design and improved performance which had been developed unnoticed in what was considered, by some, as a somewhat industrially backward Soviet Union.

During the pre-war years, the Soviet Union had two tank types in mass production; the T-26 light tank was intended for direct infantry support, while the BT5 and BT7 cavalry tanks were used for a variety of operational duties. The T-28 and T-35, multi-turreted heavy tanks, were used for battlefield observation and command. France and Great Britain deployed their tank forces in a similar way until the outbreak of World War II.

Towards the end of the 1940s, this concept was critically reviewed by Soviet military planners and a decision was made not to continue the practice of developing existing designs. Instead, they would be replaced by completely new designs – battle tanks far ahead in technology than those being developed in the west.

The T-34 Medium Tank

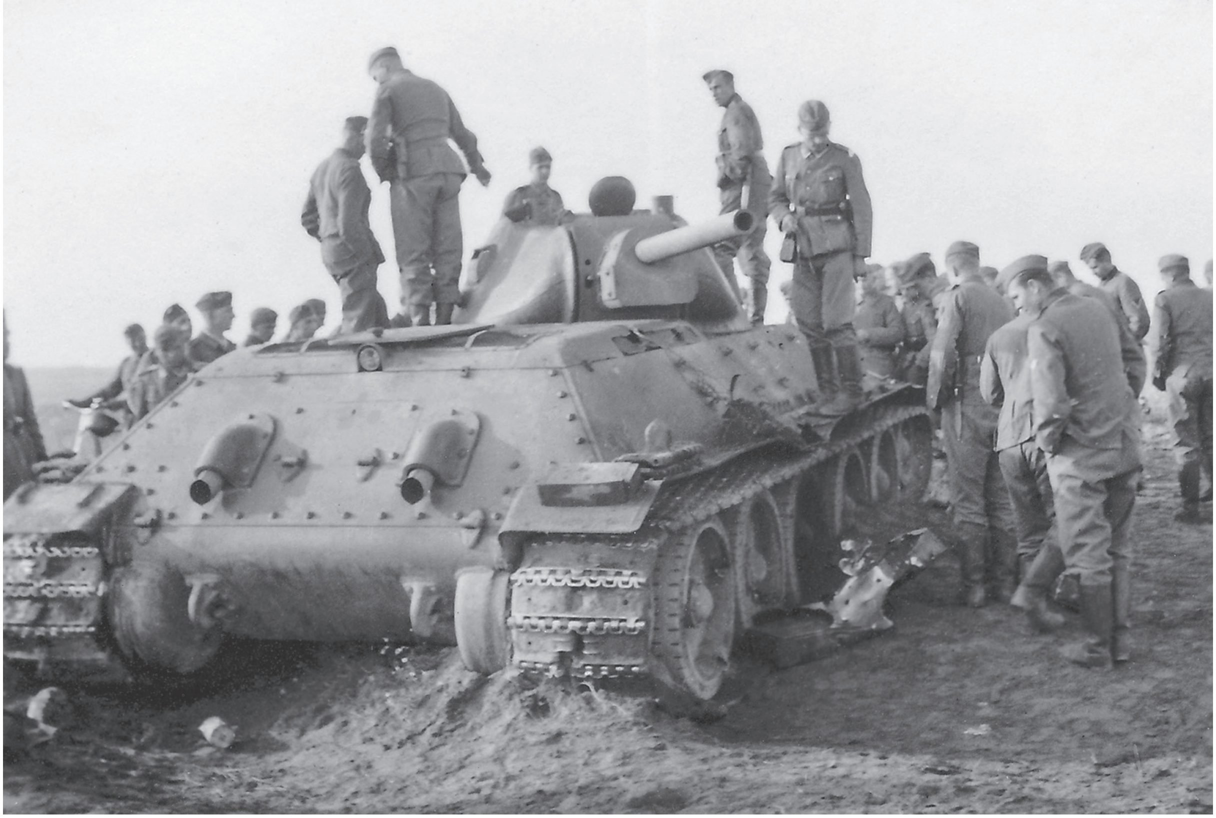
The T-34 was designed from the outset as a medium tank, and (unique at the time) had a hull with sloping (60° front, 40° sides, 48° rear) surfaces, fabricated from welded armoured steel plate. (Although frontal protection was moderate at 45mm, the sides and rear were an impressive 40mm.) The sloping armour provided a very high level of protection, but the true horizontal thickness was significantly higher as an incoming shell would quite often ricochet off without causing damage.

The running gear was a further development of the Christie-type bogie as used on the BT series. The option of removing the tracks for running on roads at high speed used on the BT was rejected, possibly due to unsatisfactory experience in service. All components were designed to suit the Russian terrain; broad track plates and the large-diameter running wheels had no gaps which prevented them from becoming blocked by mud, stones and gravel. In the *Rasputitsa* (mud season) of autumn and winter, the T-34 remained operational where other types (including German) were immobilized.

The T-34 was powered by a 38,800cc Model V-2-34 V-12 diesel engine mounted in the rear, ahead of the KMDB-designed transmission which drove the rear sprockets. The 500hp engine propelled the 29-ton tank at 53kph.

The KV Heavy Tank

The KV (Kliment Voroshilov) was produced initially in two variants; the KV-1 heavy breakthrough tank, and KV-2 assault gun with a heavier gun for fire support. The hull and turret on both versions was fabricated from welded



German troops inspect a damaged T-34. At the time, the type had better all-round armour than German tanks which, to save weight, had much thinner side and rear armour. Also the T-34 had a much easier (more economical) to manufacture cast-steel turret. (Anderson) armour plates. By 1940 standards, the thickness of the hull and turret armour was excellent, but not sloped as on the T-34. The sides and rear of the hull were equally as thick. The running gear had six wheels on each side mounted on torsion-bar suspension, and the very wide tracks gave substantially less ground pressure than lighter German tank types. The engine and transmission were located as in the T-34, but due to the increased weight of a KV engine, power was raised to 600hp.

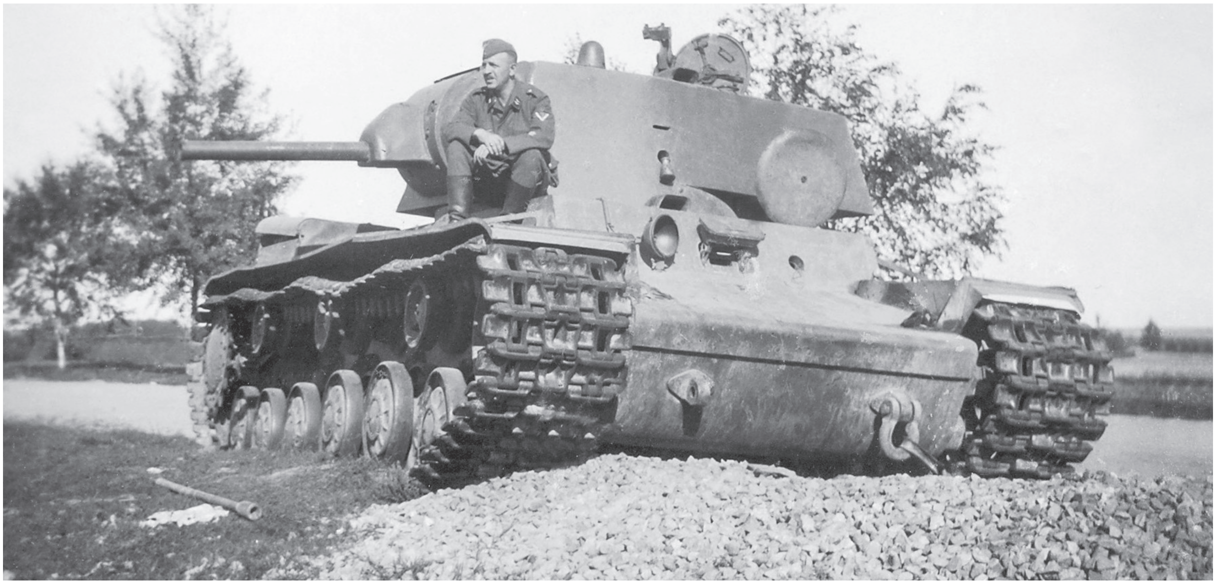
From the beginning both tanks were armed with a 76.2mm L/30.5 main gun, but towards the end of 1941 an improved long-barrel (L/41.5) gun was being used.

The performance of the T-34 and KV were far superior to all enemy tanks, but their fighting value was relative to the economic and political situation in the Soviet Union. For example, there were serious difficulties with maintaining a supply of important components; even radio equipment, vital to tank commanders on the battlefield, was not so much as promised. In general, military training was very poor and not suited to modern mechanized warfare.

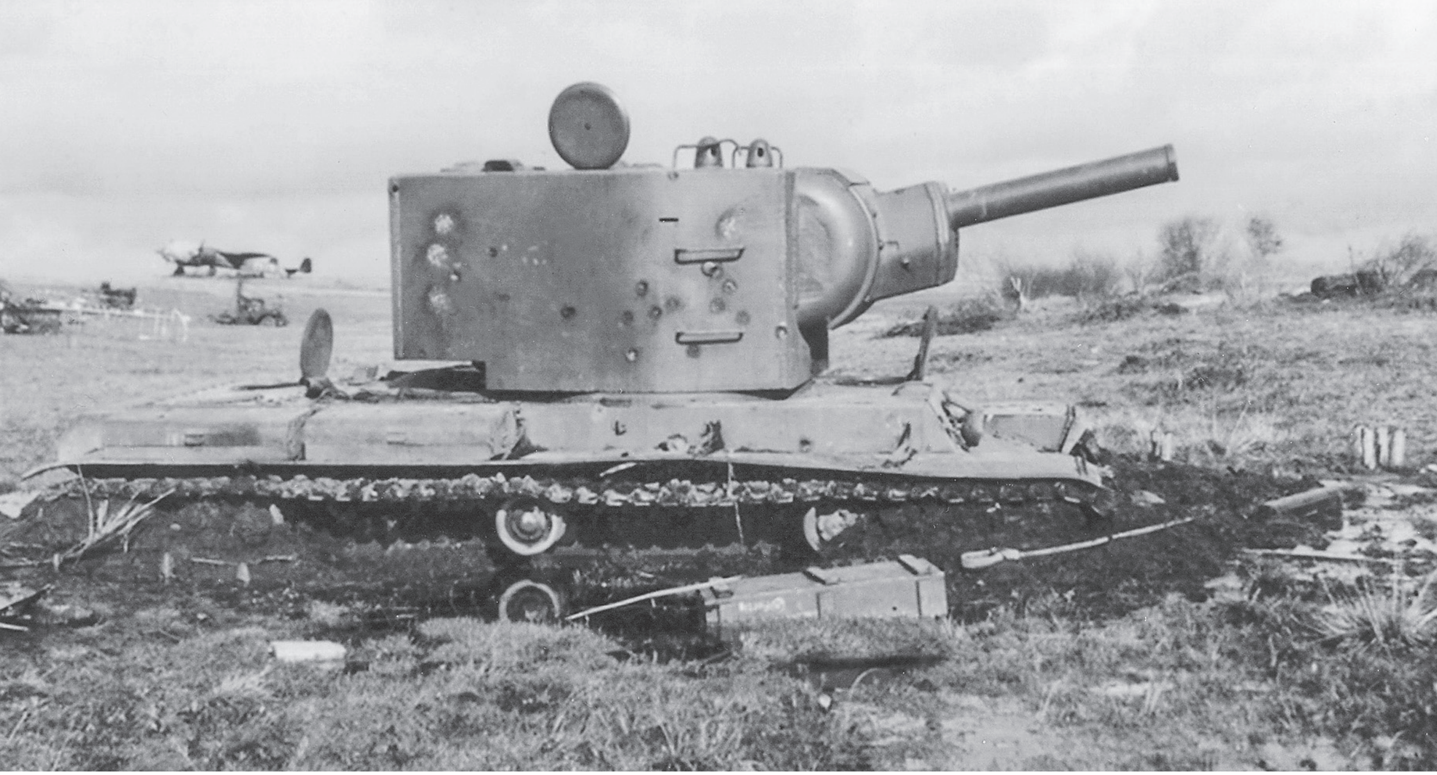
Engaging the T-34 and KV

German forces, whose own tanks were outclassed, found it very difficult to combat the new Soviet tanks. On 22 October 1941, 4.PzDiv sent an urgent request for assistance to XXDXIV PzKorps:

> Combating Russian heavy tanks.
>
> During recent battles, 4.PzDiv has repeatedly engaged Russian heavy tanks. At first these appeared only occasionally and could be avoided or driven off by concentrated artillery fire.



The Kliment Voroshilov-1 (KV-1) used the same engine and transmission as the T-34 and was also fitted with torsion bar supension. Although heavily armoured, the type was of more conventional construction. (Anderson)



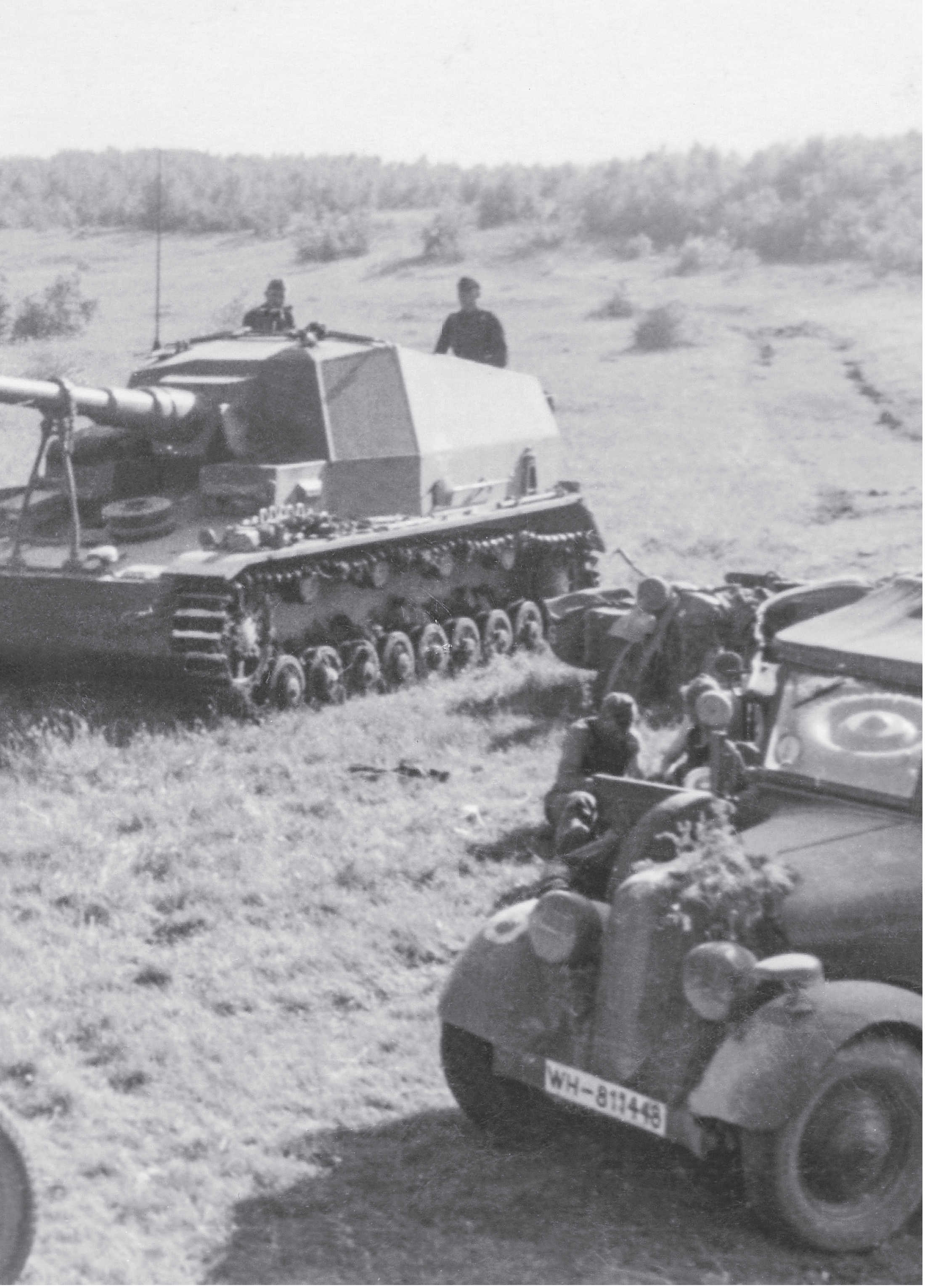
The KV-2 heavy artillery assault gun mounted a 152mm ML-20S howitzer and was built on the chassis of the KV-1. The vehicle has received a number of hits which have not penetrated the heavy armour. (Anderson)

After the capture of Or'ol, the Russians deployed their heavy and heaviest tanks for the first time in a massed attack. In several battles, the heaviest fighting took place because the Russian tanks were no longer deterred by artillery fire. In these battles, and for the first time in the campaign, the undoubted superiority of the Russian 29t and 52t tanks over our PzKpfw III and IV was evident. Most of the Russian tanks would be assembled in a semi-circle at a range of 1,000m and open fire on our tanks with their 7.62cm guns. The penetrative power was enormous and their accuracy very good.

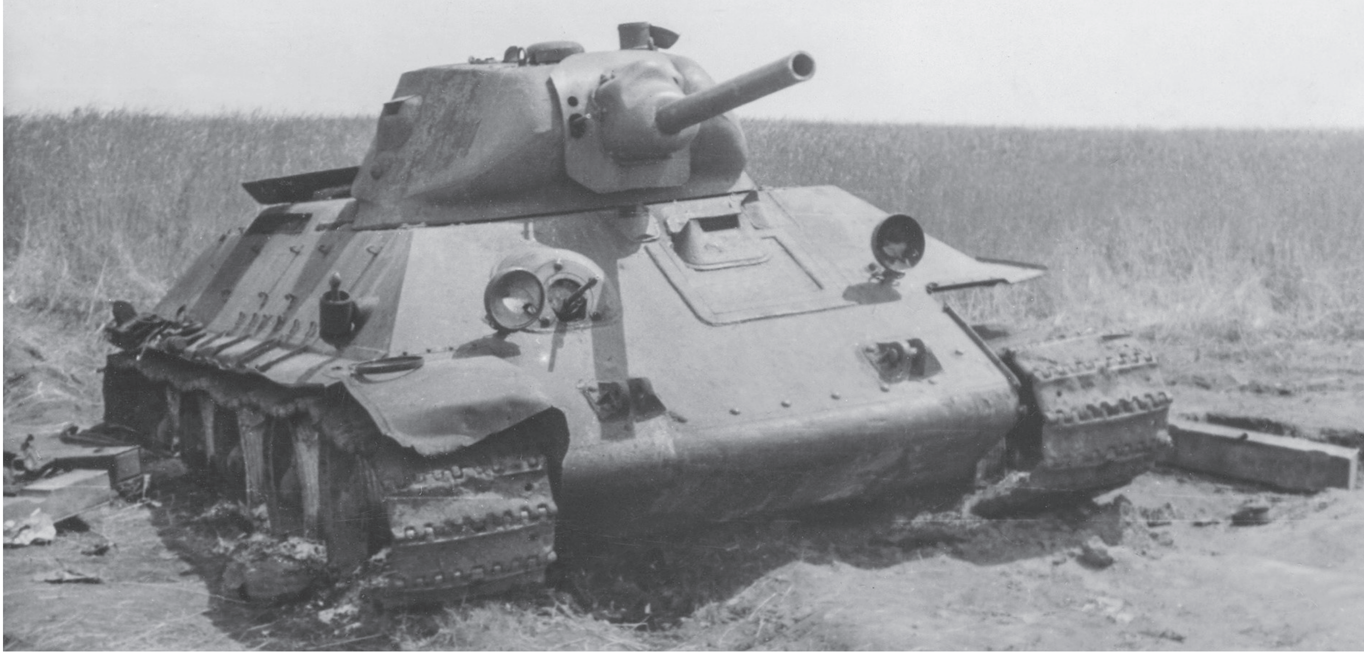
While our 5cm gun was not able to score a penetrative hit at the most sensitive points (except at 50m range and under especially favourable circumstances), our tanks were being hit at a range of several hundred metres. Repeatedly, our tanks are destroyed by a frontal hit; on a number of PzKpfw III and IV the commander's cupola has been completely shot away.

Besides the superior weapon performance and heavy armour, the T-34 is without doubt superior in speed, manoeuvrability and has a superior turret-traversing mechanism. The type has wide tracks which enable it to cross marsh-type terrain which is impassable to our tanks. Ground pressure is much better than with our tanks so that, despite their greater weight, Russian tanks can cross the same bridges we use.

The excellent diesel engine also deserves our attention. During the advance from Gluchov to Mzersk we never came across a single Russian tank which had



Panzerjägerabteilung (PzJgAbt – tank hunter battalion) 521 was equipped with two 10cm K18 auf PzSfl IVA. Krupp built both in 1941, using the PzKpfw IV Ausf A chassis, as a *Schartenbrecher* (bunker buster) vehicles. Both were deployed on the Russian Front but were found to have poor manoeuvrability and were occasionally used against the modern T-34 and KV tanks. (Anderson)



The driver of a T-34 was provided with a large hatch which could be opened to allow a very good view. However this was also a weak spot in the frontal armour. (Anderson)

failed due to mechanical problems; whereas, some 20 tanks from PzRgt 35 were stranded along the same stretch due to mechanical failures. However, we have noted that the Russian tanks were new from the factory.

Our tanks do have a special advantage; the commander has a better view of the battlefield due to the number of vision blocks in the cupola.

Above all we have gained the impression that the Russian has become aware of the superiority of their tank force and from now on deploy it accordingly. Over time this will have a detrimental effect on the morale of our tank troops.
To fight these Russian heavy tanks, we submit the following suggestions:

1.) Creation of a weapon of attack against heavy tanks.
    (a) Immediately replicate a Russian 29t tank and also re-deploy captured undamaged 29 and 52t tanks using our crews. Ideally one company in each PzRgt.
    (b) Instal the Russian 7.62cm gun in a PzKpfw IV; if necessary without the commander and any armour reinforcement. Also the co-axial *Maschinengewehr* (MG) can be removed.
    (c) Introduction of a 10cm self-propelled anti-tank gun. It is essential to have at least six per PzRgt.
    (d) Creation of new ammunition with significantly increased penetration performance.
    (e) As an immediate or emergency measure: installation of 5cm anti-tank gun in the PzKpfw III even if it increases weight over the front of the vehicle.

2.) Creation of a defensive weapon against heavy tanks.
  (a) 10cm self-propelled or towed anti-tank gun.
  (b) Better ammunition
  (c) Withdrawal of the 3.7cm PaK gun in favour of the more powerful 5cm PaK. Use captured Russian 7.62cm PaK whenever possible.

The are numerous reports in the archives that have a similar content. The despair felt by a tank commander firing shell after shell at these Russian tanks without being able to stop them can be easily imagined. In this context the wishes expressed in the report are understandable, but a closer examination reveals that they could not be tactically or technically realized.

In mid-November 1941, as a direct result of that situation, a Special Tank Commission was created. A group of designers travelled to the *Ostfront* (East Front) in order to inspect the new enemy tanks. On 18 November 1941, *Generaloberst* Guderian of PzGruppe 2, delivered an address to the commission:

> Address by *Generaloberst* Guderian to the Special Tank Commission.
>
> Those in attendance: *Oberst* Fichtner, Major Ründen, *Oberbaurat* Kniepkamp, Prof Dr F. Porsche, Dir.Dr. Hacker (Steyr), Dir Dr. Roland (Vereinigte Stahlwerke), Dir. Wunderlich (Daimler-Benz), Dir. Dorn (Krupp Kanonen), *Oberingenieur* Aders (Henschel), Ing. Oswald (MAN), *Oberingenieur* Zimmer (Rheinmetall).
>
> *Generaloberst* Guderian expressed the following in his welcoming speech:
>
> A) Tanks
> In the Polish and French campaigns, and in the first part of the campaign in Russia, our tanks were in every way superior to those of our opponents. The Russian heavy tanks first appeared at Beresina and were superior to our own, especially in armour and firepower.
>
> It is the task of the armaments industry to restore our original superiority. In the Russian campaign we experienced difficulties with the terrain on a previously unknown scale. In summer there was dust, which had a most unexpected damaging effect on engines. In autumn, deep mud both in the terrain and on lightly-gravelled roads or dirt tracks. From here it became clear that we need to reduce the ground pressure of the tracks. Moreover driving through mud imposes colossal demands on all military vehicles. In winter, frost hardened the terrain which cause tank tracks to slide. Also the extremely low temperatures made many items brittle and break easily. The snow which we are expecting next will bring new difficulties.
>
> At the moment we have in running order:
>   50 percent of wheeled vehicles
>   75 percent of tractor towing vehicles
>   20 percent of the tanks

The autumn weather on the Eastern Front caused conditions on unmade roads to deteriorate and cause serious problems for the narrow tracks on German tanks. Here pioneers struggle to dig out a bogged-down PzKpfw III Ausf G armed with a 5cm KwK L/42. (Anderson)

Here it must be remembered that our actual fighting strength will be reduced by breakdowns occurring at any moment.

Further we have:
20 percent of tanks not currently capable of being repaired
30 percent of tanks beyond repair
25 percent of tanks not in running order due to a lack of spares

We had a starting strength of 1,000 tanks including 150 new vehicles. Today we have 150 tanks operational. All the others are unfit for combat.

Requirements for winter equipment

1.) Improvement of the available tank types.
A new gun which will penetrate the Russian tank from a range at which our own tanks are not vulnerable. On no account must current production be interrupted; some may conclude that real improvements to armour and running gear cannot be made. The men in the field will allow for that if the requirement for a new gun is met.

2.) New designs
Better armoured tanks, improved running gear with broader tracks, a more powerful gun, more engine horsepower to give a better power-to-weight performance thus allowing long-distance drives over unmade tracks and across open country to be made.

B. Anti-tank *Panzerjäger*
Concluding discussion with the Special Tank Commission on 21 November 1941.

In his concluding speech to the conference, Guderian listed in order of priority the requirements for improving the tank force:

1.) More powerful armament
2.) Greater tactical manoeuvrability
3.) Thicker armour

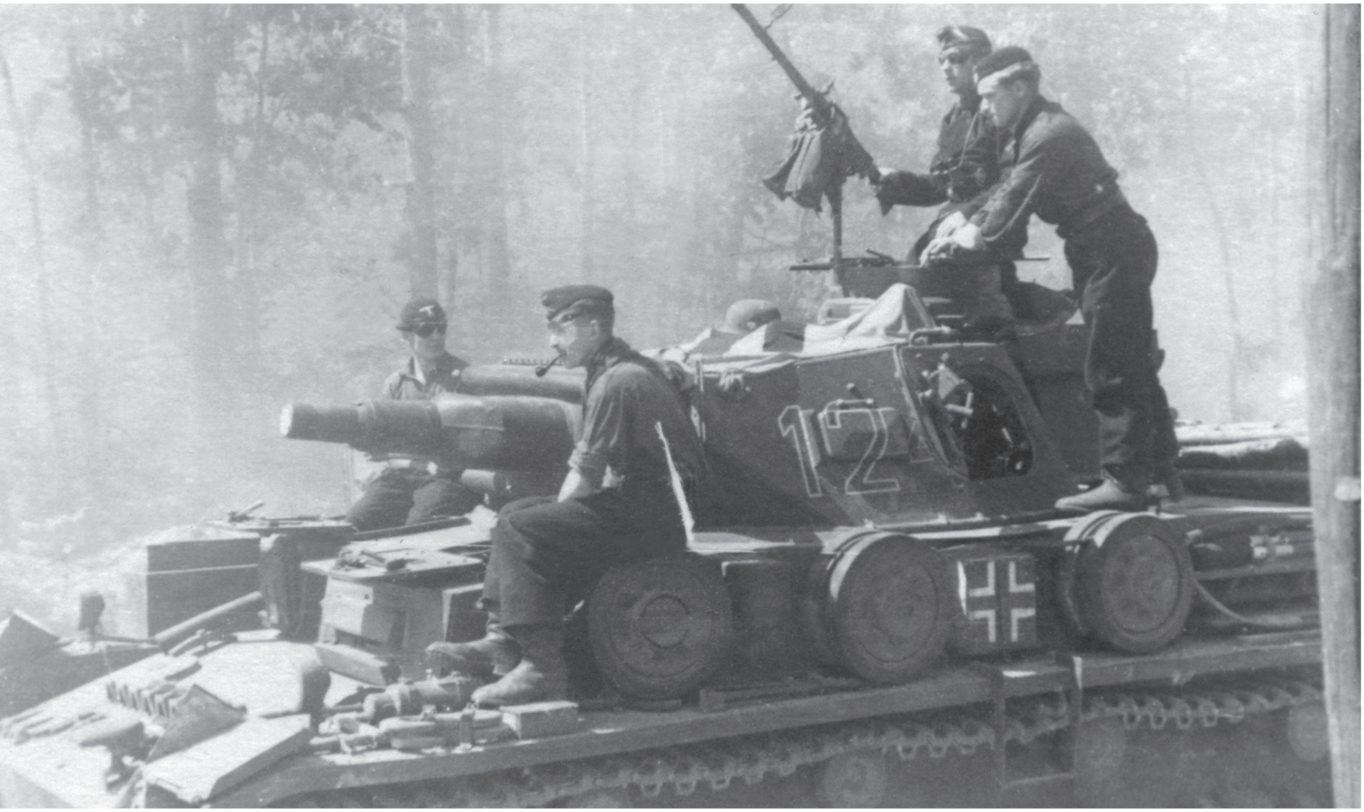
The *Generaloberst* emphasized that at the beginning of the next offensive every PzAbt must have guns able to penetrate [Russian armour] either fitted in the tank, or as accompanying anti-tank weapons, so that our troops once again have the feeling of superiority in firepower.

A suggestion considered to be very useful is to send future tank crews to the factory assembly line to observe the production process.

The introduction of a *Selbstfahrlafette* (Sfl) [self-propelled (SP)] chassis for the artillery and tank-support artillery is desirable. This would release a corresponding number of towing tractors. However, supply of the Sfl must not interfere with the production of PzKpfw IV.

Also emphasized is the need for more armoured infantry carriers, armoured ambulances and cross-country motor vehicles.

Some of the PzKpfw III and IV were fitted for deep fording. These amphibious tanks were used to cross the border River Bug into Soviet occupied Eastern Poland. The gun on this PzKpfw IV Ausf D *als Tauchpanzer* (diving tank) has a waterproof cover, and an anti-aircraft *Maschinengewehr* (MG) 39/41 has been mounted on the cupola. (Anderson)



Technical Challenge

2

At the end of 1941, all German armaments projects were under critical examination. Priority was given to increase the fighting capability of existing tanks; additional armour and long-barrelled guns were introduced on PzKpfw III and IV in current production.

In his report of November 1941, Guderian analyzed the current situation with a logical fluency and had clearly recognized the dilemma which his tank forces faced. The weakened Panzer divisions, equipped with somewhat inferior tanks, were no longer able to fight on equal terms with the enemy. Additionally this enemy could make good his losses both in personnel and materials apparent ease.

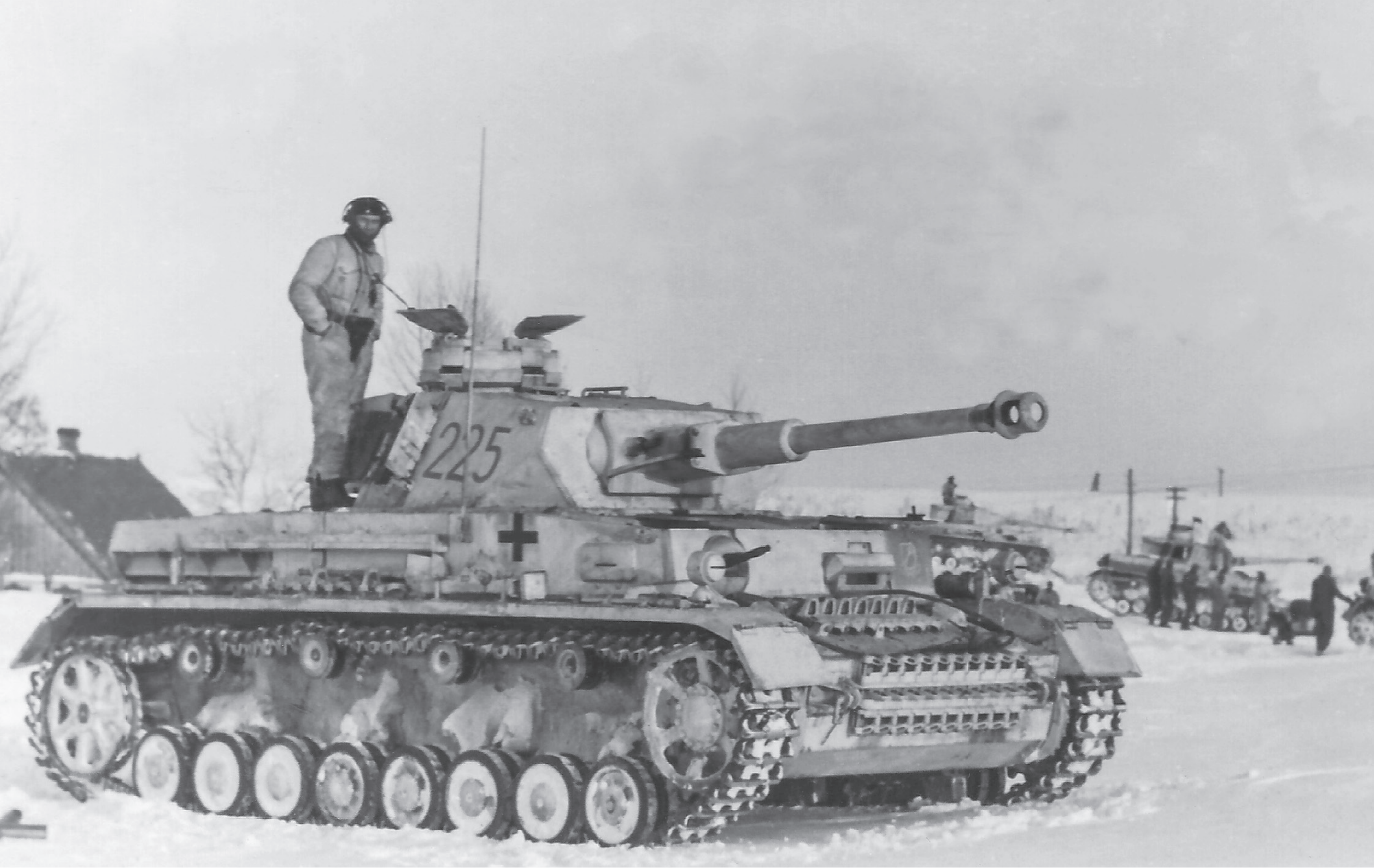
Along with other general staff officers who also had a realistic view of the situation, he saw that the goals of Operation Barbarossa were no longer achievable that year. When he asked for the siege of Moscow to be lifted, to pull back the fronts and occupy winter quarters, he had asked for the impossible: Hitler demanded an unconditional, fanatical defence of the positions held, and Guderian was relieved of his post.

It was not clear to those responsible that there were no other alternatives to the objectives required by the Special Tank Commission. With regard to tank armament there were two requirements:

1. Improvement of the existing tank types by increasing the combat value.
2. The fastest possible development of superior tank types.

A realistic planner, Guderian had recognized that production of current battle tanks must on no account be adversely affected.

In the late summer of 1942, the PzKpfw VI Tiger Ausf E heavy tank entered service. The well-armoured and armed vehicle was originally designed as a *Durbruchswagen* (breakthrough tank) and remained supreme on the battlefield until 1943. (Anderson)



During the spring of 1942, the PzKpfw IV was fitted with the 7.5cm KwK 40 gun (initially L/43, then L/48). Tank crews now had a gun which could defeat most types of tanks. Originally designed as a support tank, the PzKpfw IV became the prime German combat tank. (Anderson)

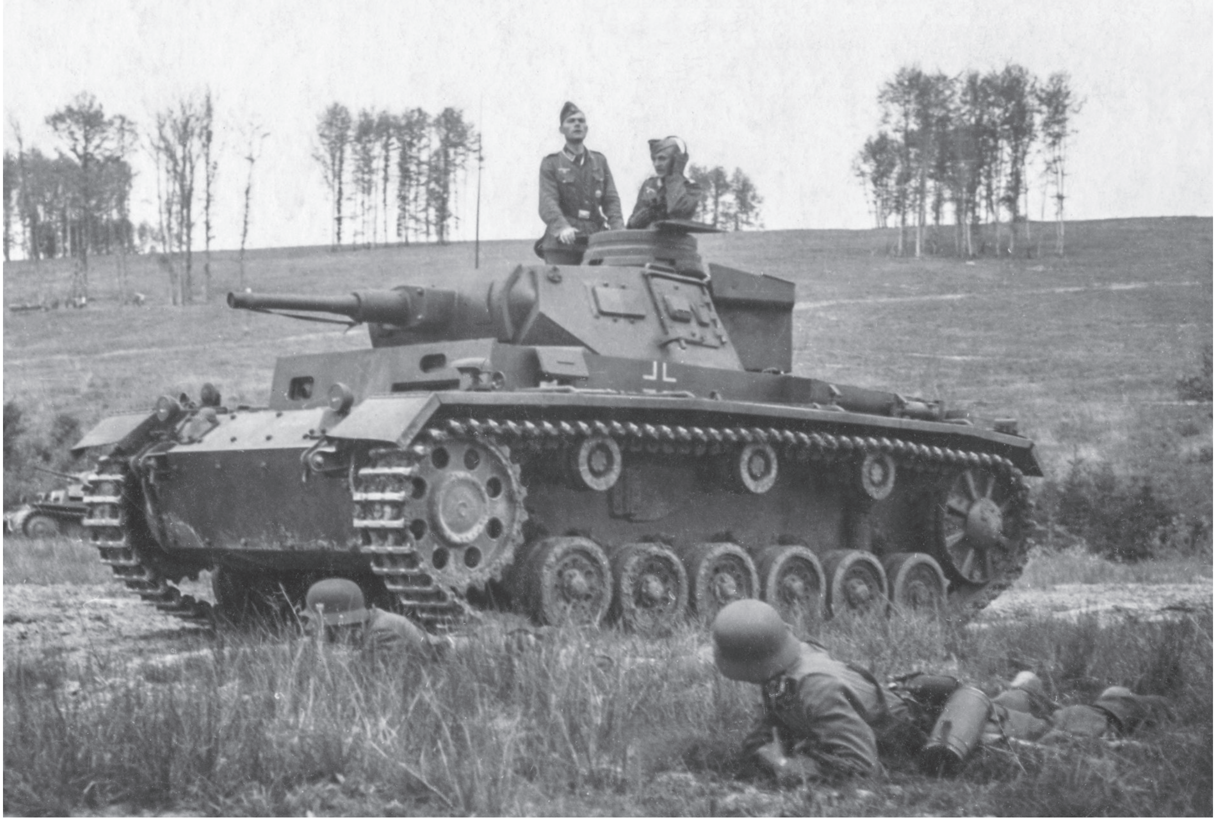
Increasing Combat Value

The first months of the Russian campaign had clearly exposed the inferiority of German tanks. From a technical and tactical point of view, captured Czech-built PzKpfw 35t and 38t were obsolete, although the high-quality running gear on the PzKpfw 38t was used successfully as a self-propelled chassis.

The PzKpfw III and IV were suitable for certain improvements to be introduced: These included:

1. Installation of a more powerful weapon with greater muzzle velocity.
2. Use of special ammunition with better penetration.
3. Increasing the frontal armour.

The 5cm KwK L/42 gun of the PzKpfw III could be replaced by the better 5cm KwK L/60, as installed in the PzKpfw III Ausf J. Both of these guns were still being used on the battlefield throughout 1942: special ammunition was available for both. Victory was certain over Soviet tanks when using the PzGr 40 tungsten-cored shell, but only at relatively short range. Because of the shortage of Wolfram, this ammunition was strictly rationed.



The combat value of the PzKpfw III Ausf E was improved by replacing the 3.7cm KwK L/45 with the 5cm KwK L/42 gun. Protection was also improved by riveting a 30mm armour plate to the front of the hull, and welding *Schottpanzer* (an armour plate with intermediate space) to the superstructure in front of the radio operator and driver positions. (Anderson)

The PzKpfw IV was decisively improved by the installation of the 7.5cm KwK 40 L/43 (later L/48) gun. Introduced from 1942 in ever greater numbers, subsequently this gun became the most important weapon of the tank force as well as the assault guns and anti-tank tank units. The tungsten-core shell was also used and performed well even over longer ranges. However, for the reasons mentioned above, the slightly less powerful PzGr 39 shell was most used, as its effectiveness was considered adequate.

A special munition was also developed for the 7.5cm KwK L/24 gun, but because of the very short gun barrel and lower muzzle velocity tungsten-core ammunition could not be used. Instead hollow-charge ammunition was introduced which had sufficient penetration over short and medium ranges. Penetration performance was increased by further development from 45mm to 100mm for all ranges. This hollow-charge shell was also available for the 7.5cm long-barrel gun.

From March 1942, the armour on all production PzKpfw III and IV was strengthened. Armour on the PzKpfw III Ausf L was increased to 50mm on the hull front, and 50mm plus 20mm on the superstructure. PzKpfw IV from the Ausf G and the assault gun StuG III Ausf F were given additional 30mm frontal armour.

At the end of 1941, the 5cm KwK L/60 gun became available and began to be mounted in the PzKpfw III from the Ausf J. In the background is a PzKpfw Ausf N which was produced from July 1942, and mounts a 7.5cm KwK L/24 short-barrelled gun. (Anderson)

In 1942 the latest variants of PzKpfw III and IV, using superior battle tactics, held a very fragile superiority in North Africa and the Soviet Union.

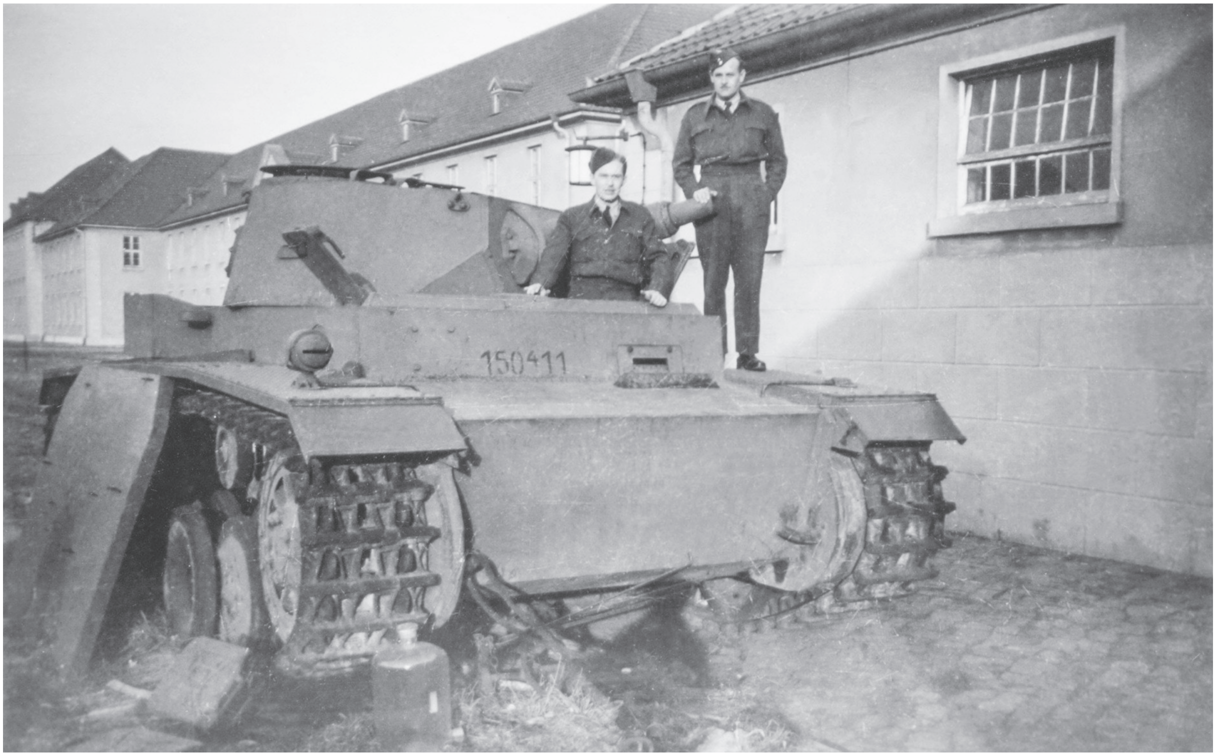
New Battle Tanks

As an informed military officer, Guderian defined clearly to the Special Tank Commission the order of priority for improving the achievement parameters of the future battle tank:

1.) More powerful armament.
2.) Greater tactical mobility.
3.) Armour.

After Guderian had been dismissed, Hitler began to involve himself ever more frequently in the development of weapons systems. He demanded the greatest possible armour for self-propelled assault guns and tanks, if necessary at the cost of mobility. There was a clear difference in thinking.

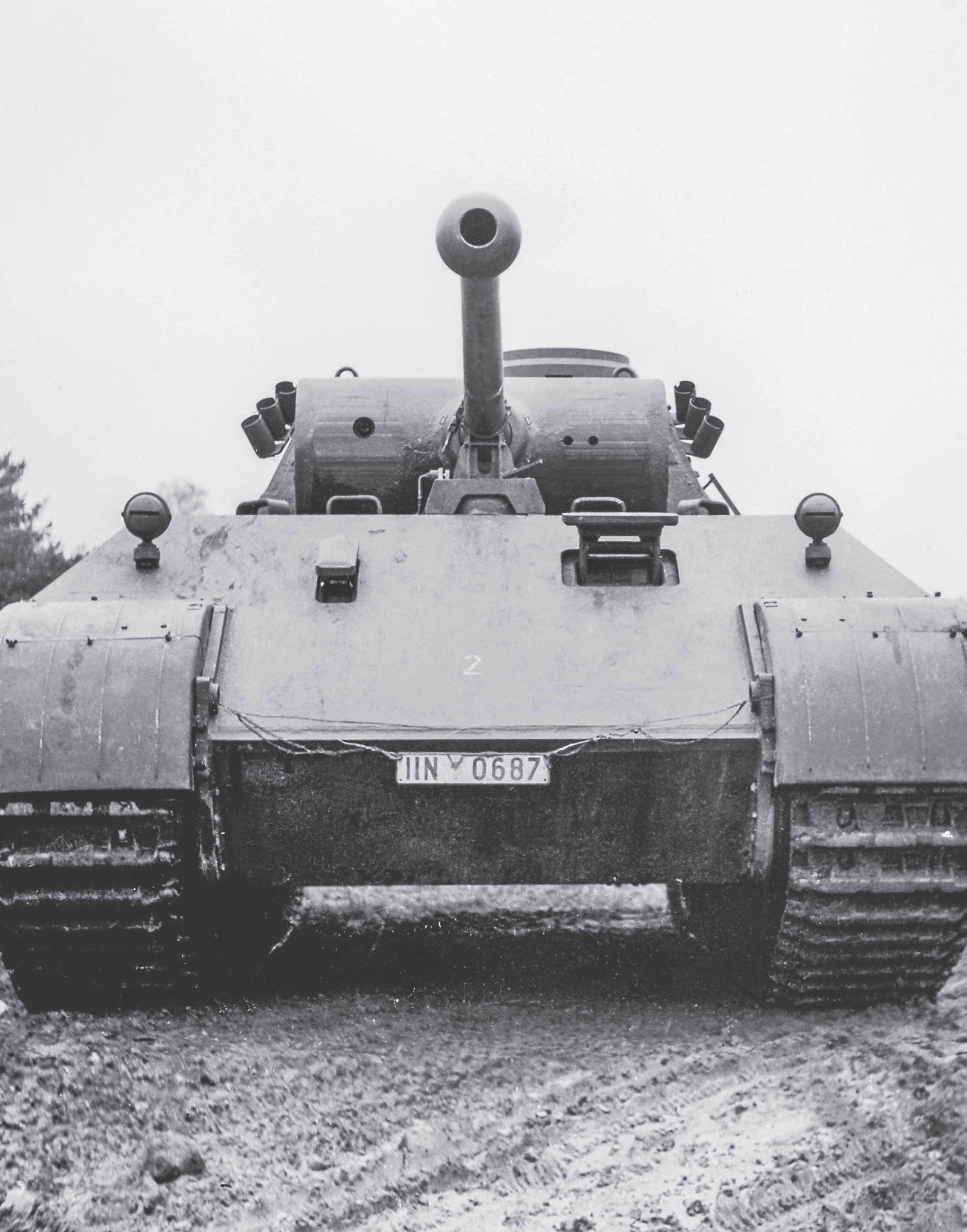
In the pre-war period, Daimler-Benz, Krupp, Porsche and MAN had been awarded contracts to develop new medium tanks (20t class) and heavy tanks (30t class). When modern Soviet tanks appeared soon after the beginning of Barbarossa, these projects were reviewed by the Special Tank Commission and declared to be obsolete.



British engineers examine a VK.3001 (H), one of the initial designs for the PzKpfw VI Tiger Ausf E, captured in 1945. Interestingly the tank mounts a 7.5cm KwK L/24 in what appears to be a PzKpfw IV turret. (Anderson)

German	PzKpfw III Ausf J	PzKpfw IV Ausf G	StuG III Ausf F
Armament	5cm L/60 2 MGs	7.5cm 40 L/48 2 MGs	7.5cm StuK 40 L/48 1 MG
Max. Penetration at 1,000 m	not known	87mm hollow charge 100mm	87mm hollow charge 100mm
Max. front armour	50mm	80mm	80mm
Battle weight	21.6t	23.6t	23.2t
Engine output	265hp	265hp	265hp
Top speed	40kph	42kph	40kph
Output/weight ratio	12.3hp/t	11.5hp/t	11.5hp/t

Russian	T-34/76 M1942	KV-1 M1942
Armament	76.2mm L/41.5 2 MGs	76.2mm L/41.5 3 MGs
Max. Penetration at 1,000 metres	67mm	67mm
Max. front armour	45mm	100mm
Battle weight	28t	46t
Engine output	500hp	600hp
Top speed	55kph	34kph
Power/weight ratio	17.8hp/t	13hp/t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VK.3002 – A New Tank Emerges

3

In 1943, after barely a year in development, the PzKpfw V Panther medium tank made its debut. The accelerated introduction of the new weapons went ahead without adequate testing. The first deployment of the type in battle at Kursk ended in a fiasco, which perhaps could have been avoided.

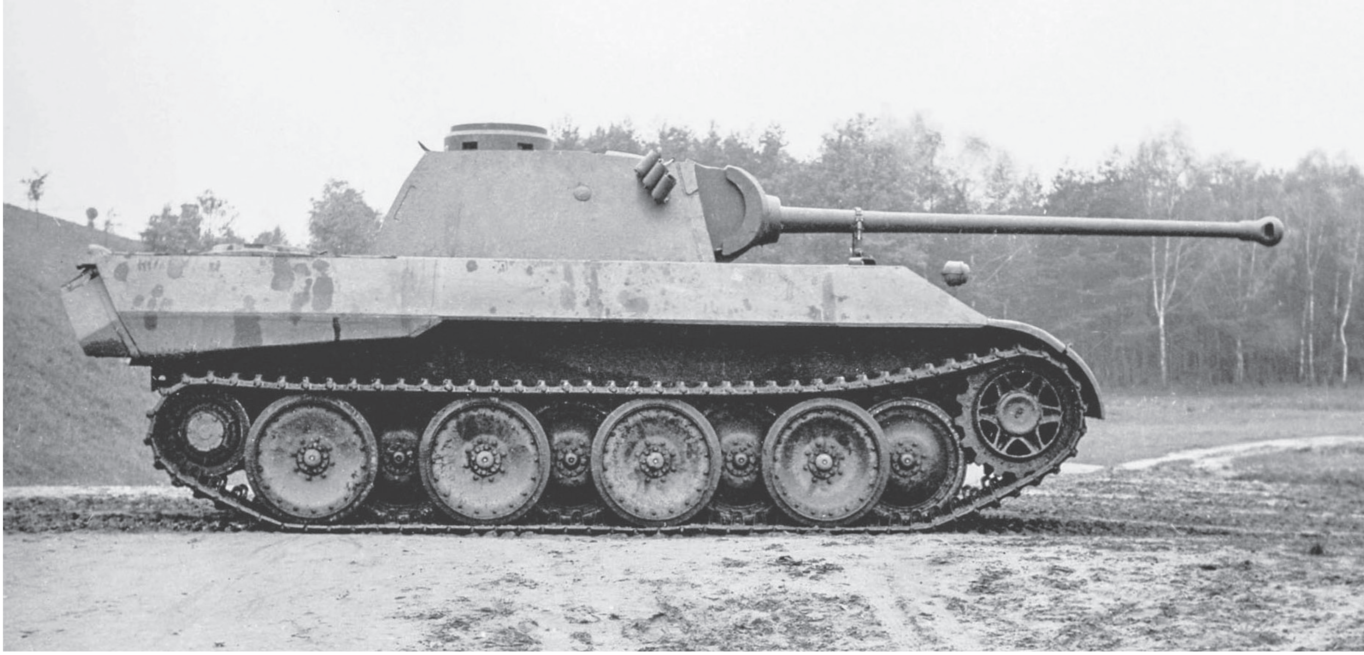
Pressured by the tense situation on the *Ostfront*, from autumn 1941 the development of more efficient battle tanks forged ahead. There were two concepts: a medium tank in the 30t class was to be developed as a main battle tank, and a heavy 45t as a heavy breakthrough tank.

Two manufacturers each were responsible for the development and construction of prototypes for the new projects: Henschel and Porsche for the heavy breakthrough tank, Daimler-Benz and MAN for the medium tank.

After the death of *Reichsminister für Bewaffnung und Munitions* (Minister for Armaments and Munitions) Fritz Todt on 8 February 1942, Albert Speer took over the role and now became a member of the inner circle of power-holders in the Reich. He kept detailed records of his conferences with Adolf Hitler, which are valuable notes providing a good overview of ongoing armaments projects. They also throw light on Hitler's active influence in matters which would have been better left to the experts.

In the following extracts taken from the records for the first half of 1942 it is clear that Adolf Hitler was intervening ever more frequently. Having regard to the substance of what he said, his contributions lead one to conclude that he lacked technical and tactical competence. On the other hand there is also the possibility that individuals sought to use the Führer's 'capacity for enthusiasm', especially in the technical area, for their own purposes. A good example was Ferdinand Porsche. His over complicated and almost technically impossible to realize ideas, inspired Adolf Hitler to such an extent that the technical experts at the Weapons Office had difficulty getting themselves heard, and did not always succeed.

A PzKpfw V Panther from the first production series. The port (left) for the hull 7.92mm *Maschinengewehr* (MG) 34 is open – a bullet shield was fitted on the Ausf A – as is that for the driver. Although the hull was fabricated from welded armour plates it was not inferior to a cast type. (NARA)



The prototype VK.3002 (MAN) differed in many respects to series production tanks. For example the hull was fabricated from seam-welded armour plating. Later this was rebate welded to give a smooth and stronger joint. Also the drive sprocket would be redesigned. (NARA)

Interesting indications are to be found in the Führer protocols with regard to the development and completion of the later PzKpfw V Panther.

Notes from 5 and 6 March 1942 read:

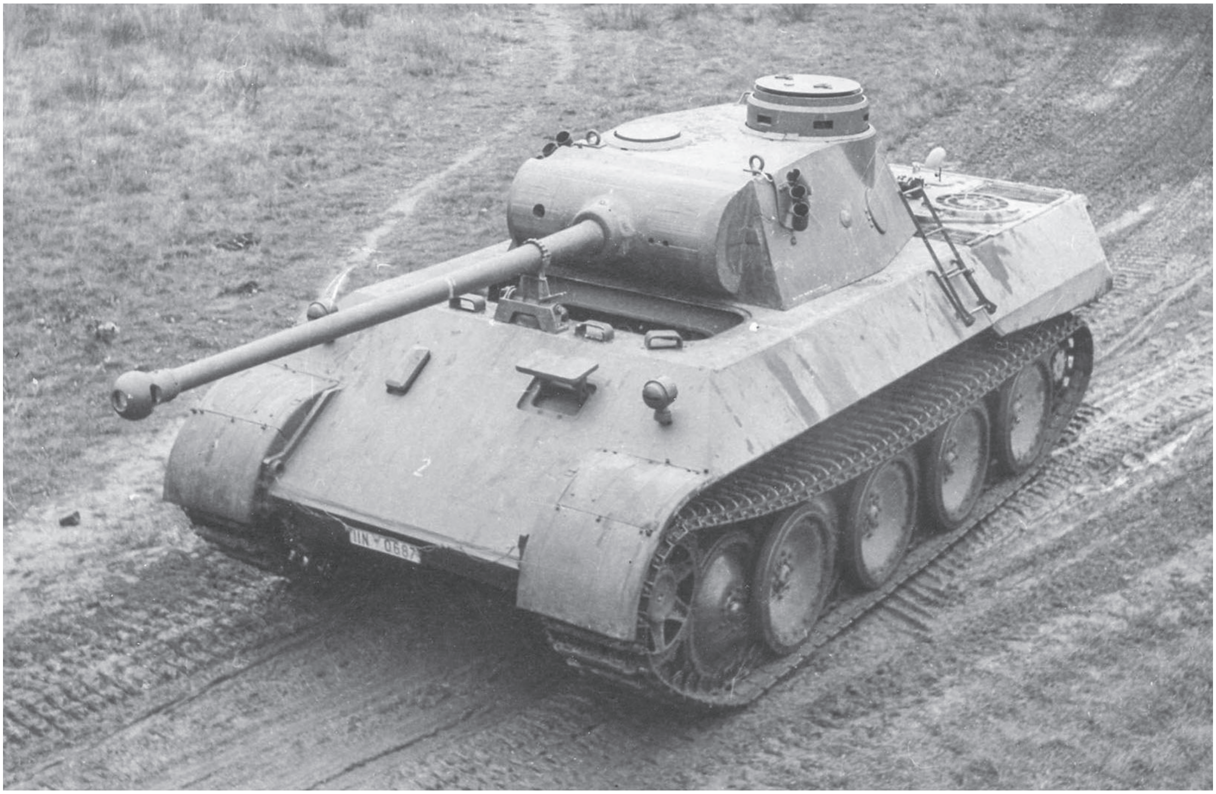
> 1.) The Führer wants the immediate carrying out of firing trials against the forward hatch cover on a T-34 as he believes that type of arrangement seems advantageous to tanks operating in the desert (fresh wind and visibility for the driver).

The Daimler-Benz design for the medium tank was essentially a copy of a T-34 and had similar type of visibility and escape hatch for the driver:

> 2.) Direction to Krupp that work should start, not on a 72t, but a 100t experimental vehicle to be developed as soon as possible so that the first trials can be carried out shortly, definitely before spring 1943.

Here Hitler's inclination towards even larger tanks is very clear. The demand to have a 100t tank developed within a year seems in retrospect to be somewhat optimistic. It is unnecessary to add that this project was passed to Ferdinand Porsche.

> 7.) At my suggestion the Führer orders that all measures for the development of the Daimler-Benz tank series be taken in hand and the company will receive a contract for 200 units – report of compliance within eight days. The Führer believes that the Daimler-Benz Panther will be superior to that of MAN. After

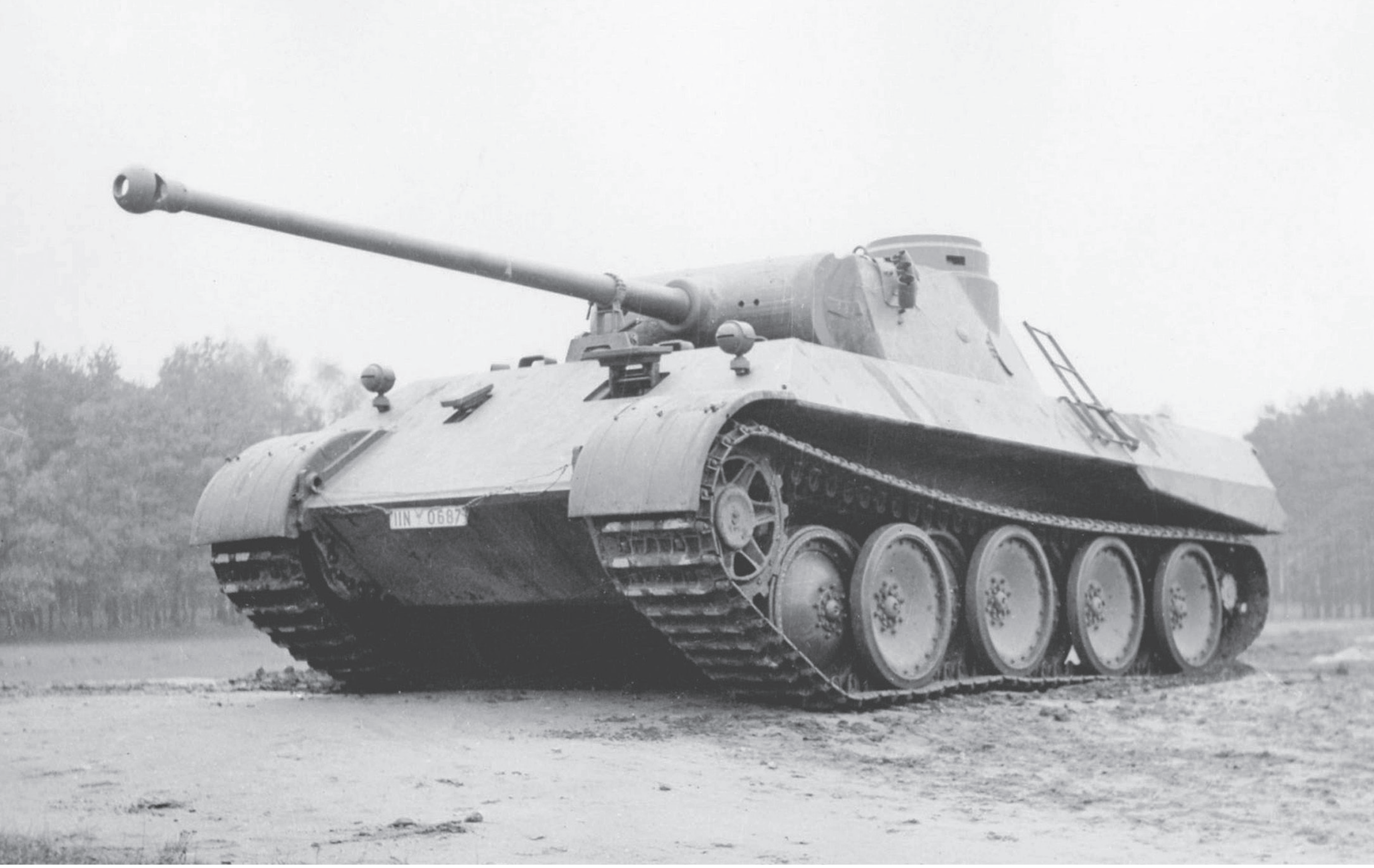


Prototype No.2 during trials on the tank proving grounds. The armoured flap for the driver is open; in action this would be closed and the driver would use an episcope device to see outside the vehicle. (NARA)

> examining various differing design points, he believes in giving preference to Daimler-Benz in nearly every case.
>
> 8.) The Führer places the greatest importance on getting the first Tigers to the Front at once. Testing could run simultaneously with front-line operations.

This appraisal by Adolf Hitler, was based on concept studies and wooden mock-ups; prototype vehicles would not be ready until May. His judgement as to the quality of the prototypes on this basis was unreasonable. On 18 April 1942, the decision was made during a meeting of the Special Tank Committee at Berlin-Wannsee:

> 1.) Heavy tanks:
>   (a) The Tiger (Porsche, Henschel). Each of these has produced their first completed vehicle according to schedule.
>   (b) The Panther (Daimler-Benz, MAN)
>   (c) Battlefield reconnaissance vehicles (MIAG-MAN, Škoda)
> 3.) Settling for the types
> In future, for every type only a single unit is to be prepared. The decision on it is to be taken immediately after the trials, probably in mid-June. Trials will be run of each individual design over a distance of 10,000km.

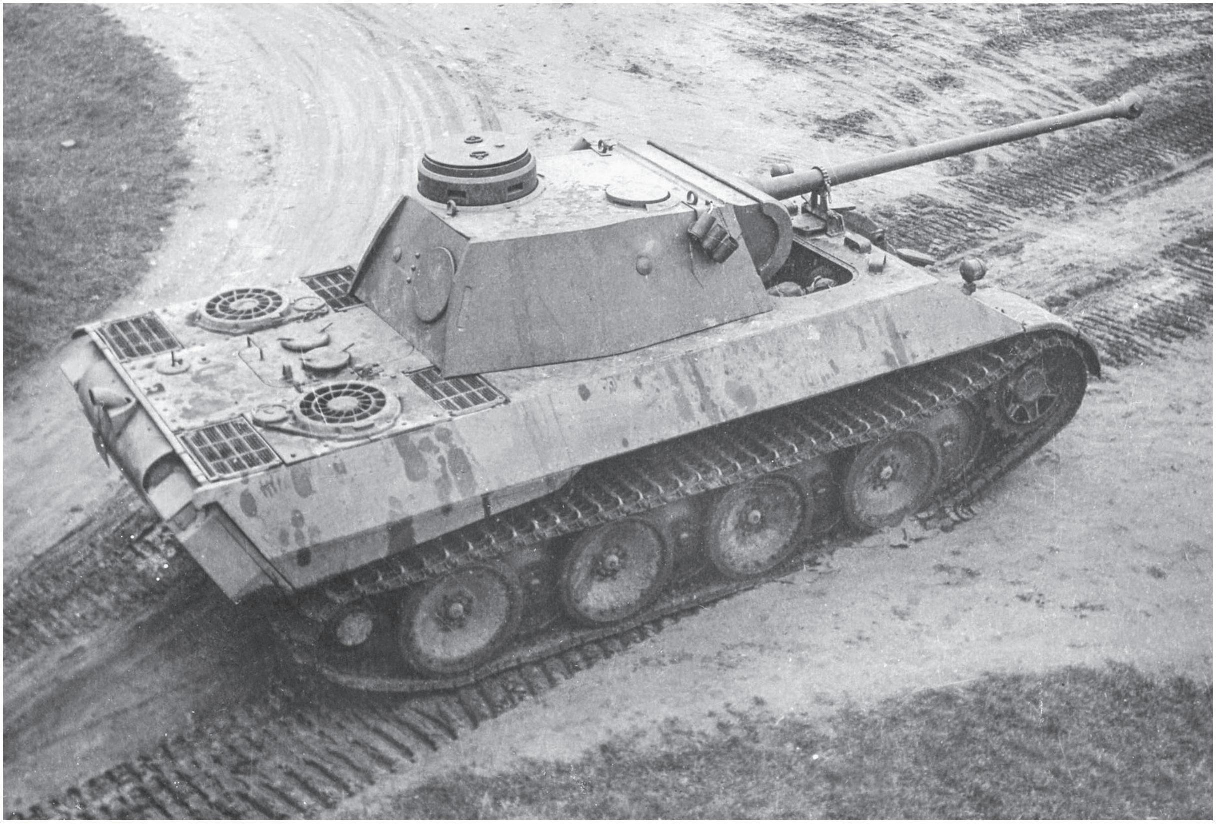


Pre-production tanks can be identified by a distinctive bulge in the side of the turret adjacent to the commander's cupola. Note the 7.5cm KwK 42 L/70 gun is still fitted with a single-chamber muzzle brake. (NARA)

> In future only one version of the chassis will be admitted for new designs.
> The decision to use either front or rear drive is to be taken beforehand since the choice will determine the entire interior structure.

The reference to settling for a type is interesting. It was to be made on the basis of exhaustive comparative tests. In the case of the completed Tiger, Hitler favoured the Porsche *Vollkettenkraftfahrzeug* (VK – fully-tracked experimental vehicle) 4501: The manufacturer had prematurely ordered 100 hulls from Krupp. However after evaluation, the *Waffenamt* decided in favour of the Henschel Tiger, and ordered the type into production. In the case of the PzKpfw V Panther medium tank, the MAN design was preferred to the Daimler-Benz.

> 4.) Tracks and Suspension
> Around 10 percent of the total production of rubber will be needed for the wheels. The situation with rubber is no longer so difficult after the increase in the arrival of blockade-running ships. The advantages of the 'Russenrolle' rubberless running wheel (Porsche system) have yet to be proved. It is evident that development needs to continue with the aim: lighter weight, higher speed. The requirement for high speed – currently our principal superiority over enemy tanks – can only



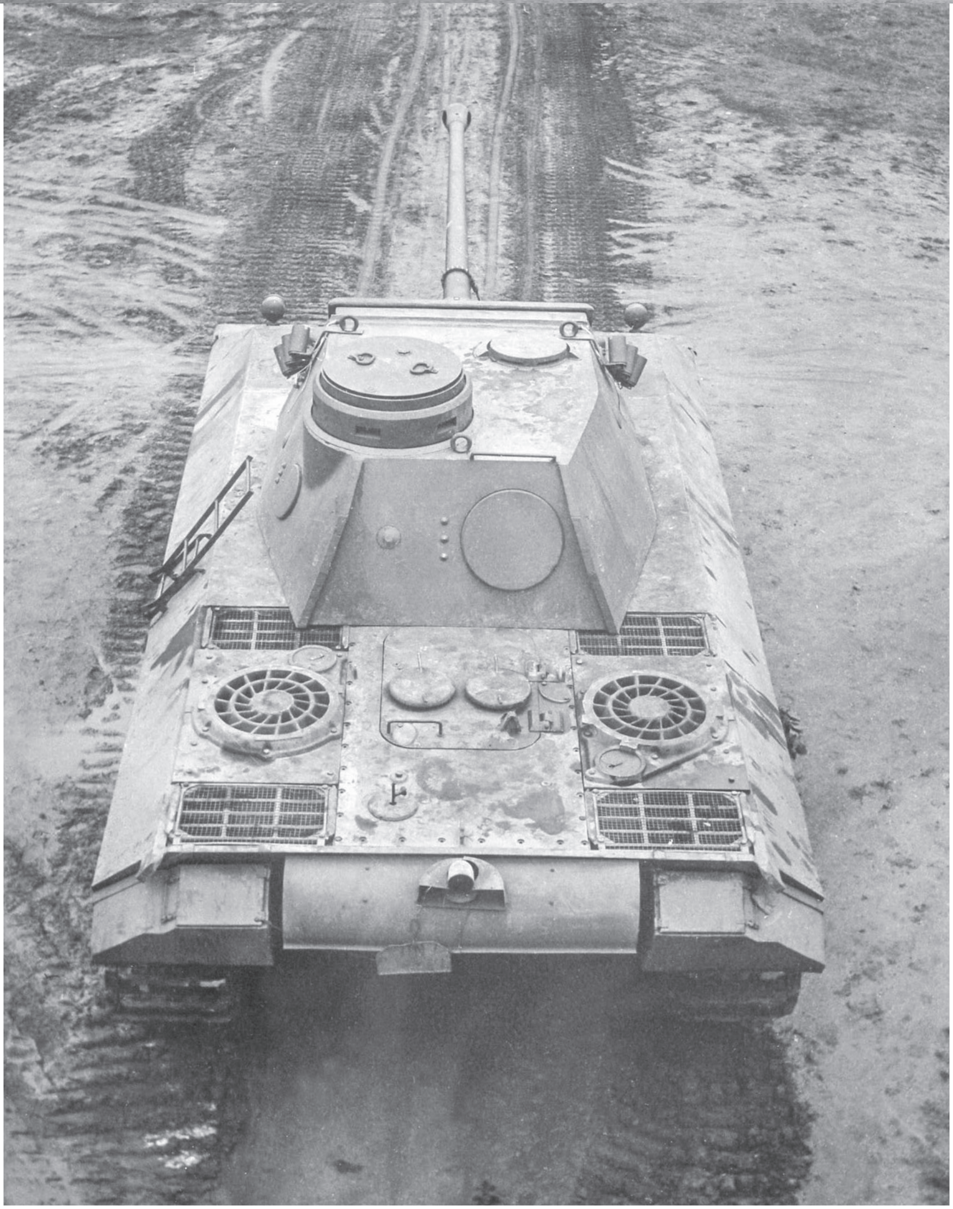
Three smoke-candle dischargers were mounted on each side of the the turret, but after experience in combat these were removed on later production vehicles. The cover plate over driver and radio operator positions has been removed. (NARA)

be met at the moment by using the rubber-running wheel. [This statement is somewhat questionable. Author]
A maximum speed of 50kph for the Tiger, 55kph for the Panther and from 60 to 70kph for battlefield reconnaissance vehicles is requested, cruising speed to be 75 percent of the top speed.

7.) Factory construction projects
Minimum requirements for the preparation of construction projects were laid down as follows:

(a) Daimler-Benz
The project at Berlin-Marienfelde, to increase the output to complete vehicles was not approved following objections by *Gauleiter* Stürtz and Armaments Inspectorate III.

b) MAN
Initially three assembly halls (for 75 units) will be constructed at Feucht (total budget 60,000,000 Reichsmarks for 150 Panthers), but this must on no account interfere with the construction work in hand at Conrady (graphite electrodes). *Reichsminister* Speer agrees to support the MAN project with building materials and scaffolding from the stocks at the Party’s rally ground at Nuremberg.



On prototype vehicles, a single engine exhaust silencer (with a single pipe) was mounted horizontally on the rear plate. (NARA)

On 13 May 1942 it was decided to give the MAN design the go-ahead:

> 2.) Involved session with the Führer comparing the MAN and Daimler-Benz Panthers on the basis of the explanatory memorandum. The armour seems to be too weak. Having the engine at the rear seems right to him. However, he realizes that the most rapid possibility of completion, as suggested in the memorandum, is vital and under no circumstances must work be undertaken on two types in the manufacturing process. He said he would study the memorandum overnight and give his decision through Major Engel [his adjutant] tomorrow. Major Engel called on 14 May and advised that the Führer is in agreement with the conclusions of the memorandum, therefore the MAN Panther will be built.

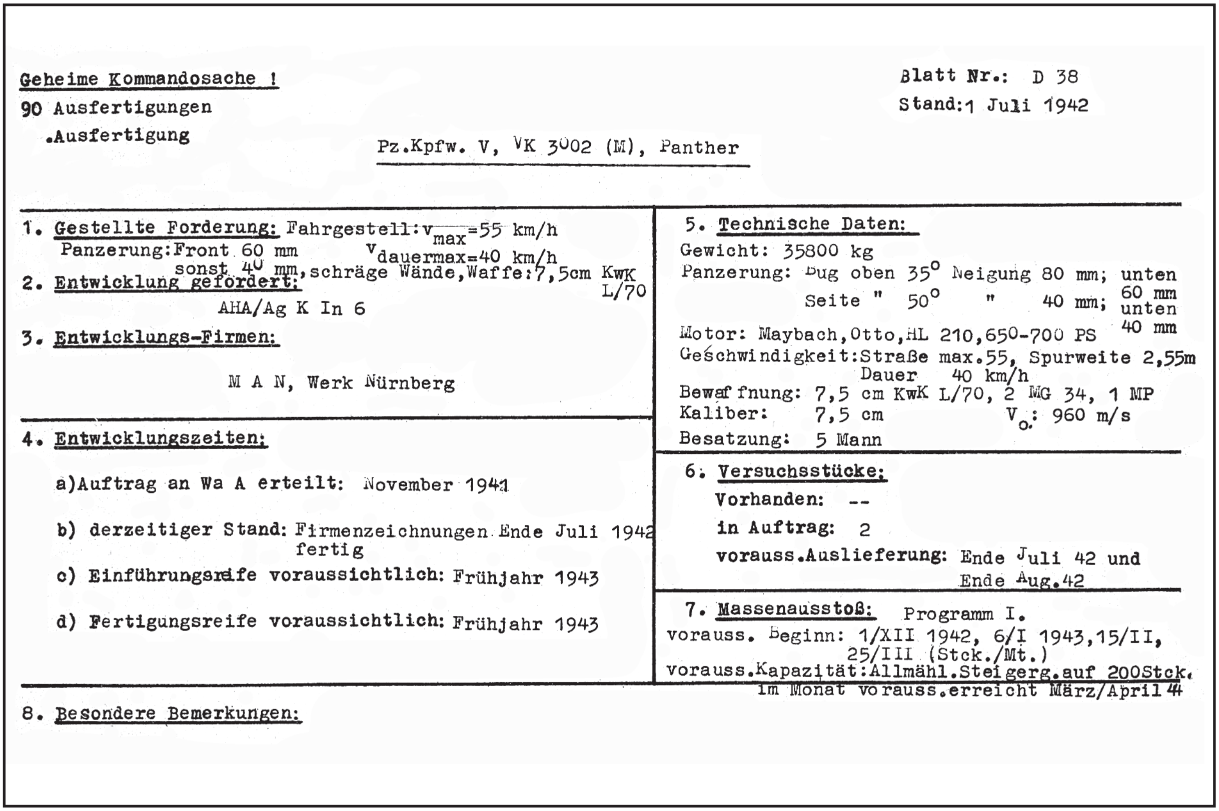
> 15.) The forecast production output of Panthers is completely unsatisfactory. We must see to it that there are 250 Panthers available by 12 May 1943.
> 22.) Regarding the thickening of the front armour of the Panther to 80mm, the Führer is still not sure if this will be enough for 1943. We should try for 100mm. As a minimum he is asking that at least all vertical parts of the Panther have 100mm armour.

On 4 June 1942, production began in earnest. It seems interesting that important specifications such as the recent increase of the frontal armour to 80mm had been called into question again. Perhaps mobility over armour, as favoured by Guderian, would hold sway.

The PzKpfw V Panther

The MAN (VK.3002 [M] Panther) was basically of conventional design, only by careful examination are many progressive and pioneering details found. During the development phase of the VK.3002 the aim was for an all-up weight of 30t. On the data page of the manual, published on 1 July 1942, combat weight was given as 12 percent higher, but the estimates proved too low as the first prototype weighed 44t.

This document for the VK.3002 (MAN), shows that initially the maximum thickness of the front armour was to be 60mm. However, this was quickly revised to 80mm. (Anderson)



Geheime Kommandosache !
90 Ausfertigungen
.Ausfertigung

Blatt Nr.: D 38
Stand: 1 Juli 1942

Pz.Kpfw. V, VK 3002 (M), Panther

1. **Gestellte Forderung:** Fahrgestell: v_{max}=55 km/h
Panzerung: Front 60 mm $v_{dauermax}$=40 km/h
sonst 40 mm, schräge Wände, Waffe: 7,5cm KwK L/70

2. **Entwicklung gefordert:**
AHA/Ag K In 6

3. **Entwicklungs-Firmen:**
M A N, Werk Nürnberg

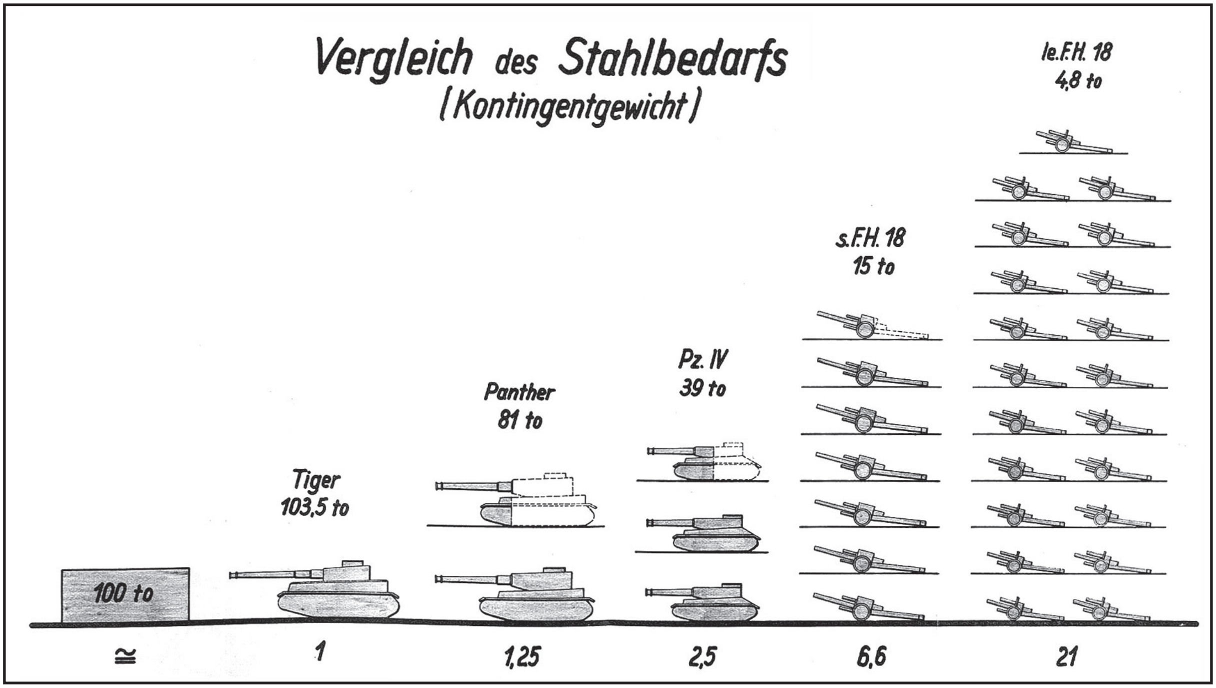
4. **Entwicklungszeiten:**
a) Auftrag an Wa A erteilt: November 1941
b) derzeitiger Stand: Firmenzeichnungen Ende Juli 1942 fertig
c) Einführungsreife voraussichtlich: Frühjahr 1943
d) Fertigungsreife voraussichtlich: Frühjahr 1943

5. **Technische Daten:**
Gewicht: 35800 kg
Panzerung: Bug oben 35° Neigung 80 mm; unten 60 mm
Seite " 50° " 40 mm; unten 40 mm
Motor: Maybach, Otto, HL 210, 650-700 PS
Geschwindigkeit: Straße max. 55, Spurweite 2,55m
Dauer 40 km/h
Bewaffnung: 7,5 cm KwK L/70, 2 MG 34, 1 MP
Kaliber: 7,5 cm V$_{o.}$: 960 m/s
Besatzung: 5 Mann

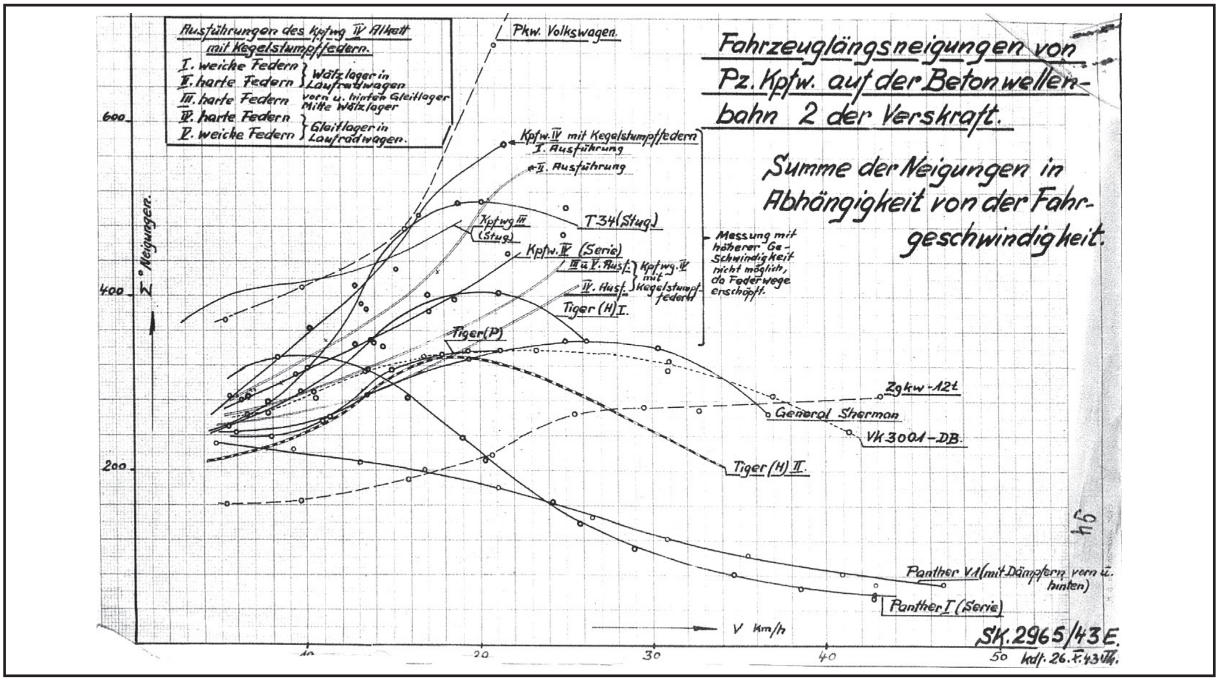
6. **Versuchsstücke:**
Vorhanden: --
in Auftrag: 2
vorauss. Auslieferung: Ende Juli 42 und Ende Aug. 42

7. **Massenausstoß:** Programm I.
vorauss. Beginn: 1/XII 1942, 6/I 1943, 15/II, 25/III (Stck./Mt.)
vorauss. Kapazität: Allmähl. Steigerg. auf 200Stck. im Monat vorauss. erreicht März/April 44

8. **Besondere Bemerkungen:**



Comparison of Steel Requirement (Weight Allotment). A graph showing the armoured steel requirements for selected weapons. (NARA)



A graph shows the results of tests to examine the gradient climbing abilities of various tanks and wheeled vehicles. Both the PzKpfw V Panther and VW Kübelwagen are outstanding. (BAMA)

The hull was fabricated from seam-welded armoured steel plate. All surfaces including the sides were sloped in order to give better protection against anti-tank fire. The introduction of sloped armour was an innovation in German tank construction obviously influenced by the Soviet-built T-34. On 26 February 1943, a working group 'Constructive Tank Development' was set up to evaluate the requirements for steel (armour plate) and other metals for the new tanks against those for assault guns (*Sturmgeschütz*) and the Tiger:

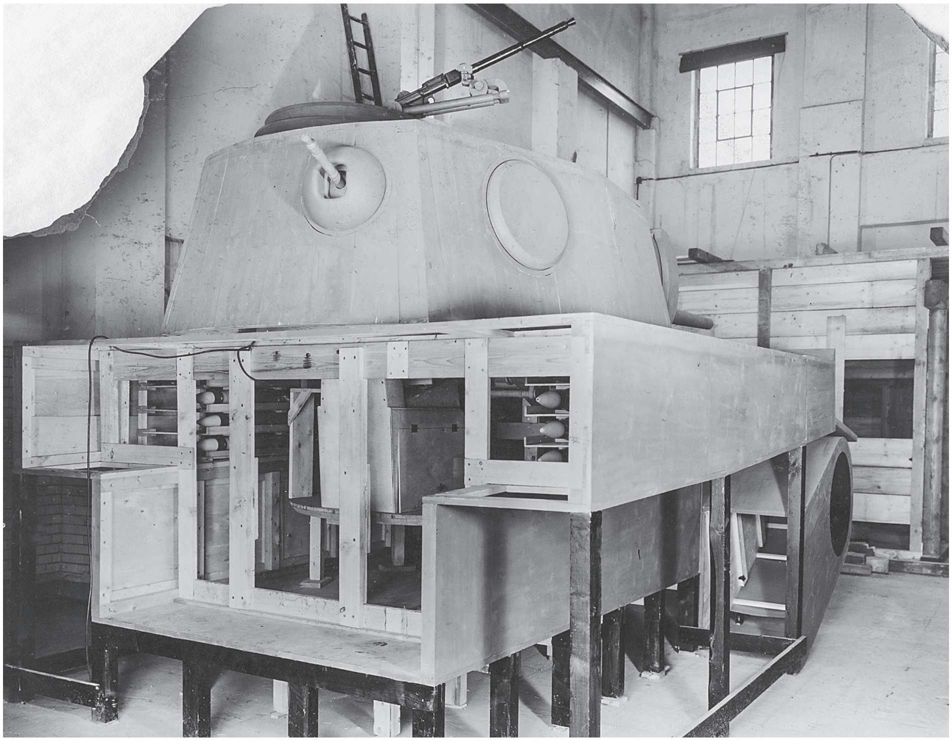
Assault guns:	30.7t
Panther:	35.5t
Tiger:	45.6t

The PzKpfw V Panther required 15 percent more in material terms to produce than an assault gun.

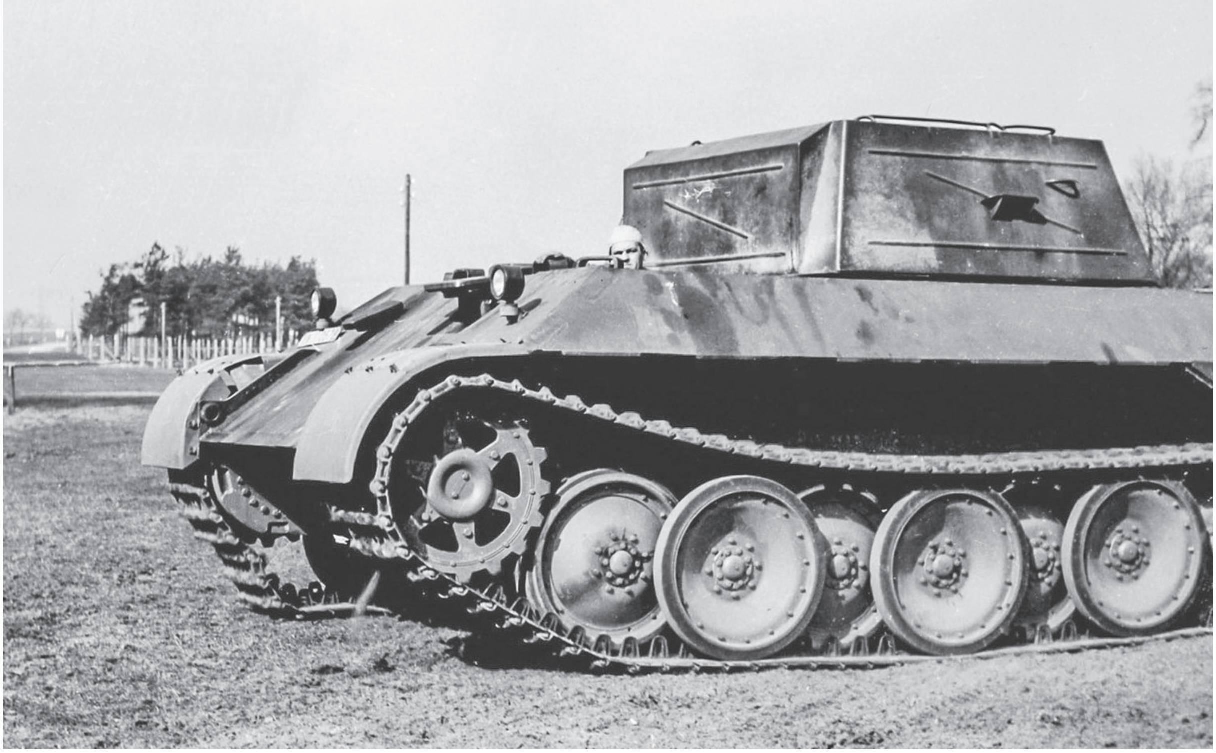
Mobility

MAN gave top priority to the design and quality of the tracks and suspension (running gear). At the beginning of the war, most German development projects were fitted with boxed-type tracks and suspension from half-track tractor units.

MAN decided to develop an expensive double torsion-bar suspension system damped by four shock absorbers mounted inside the hull. The system

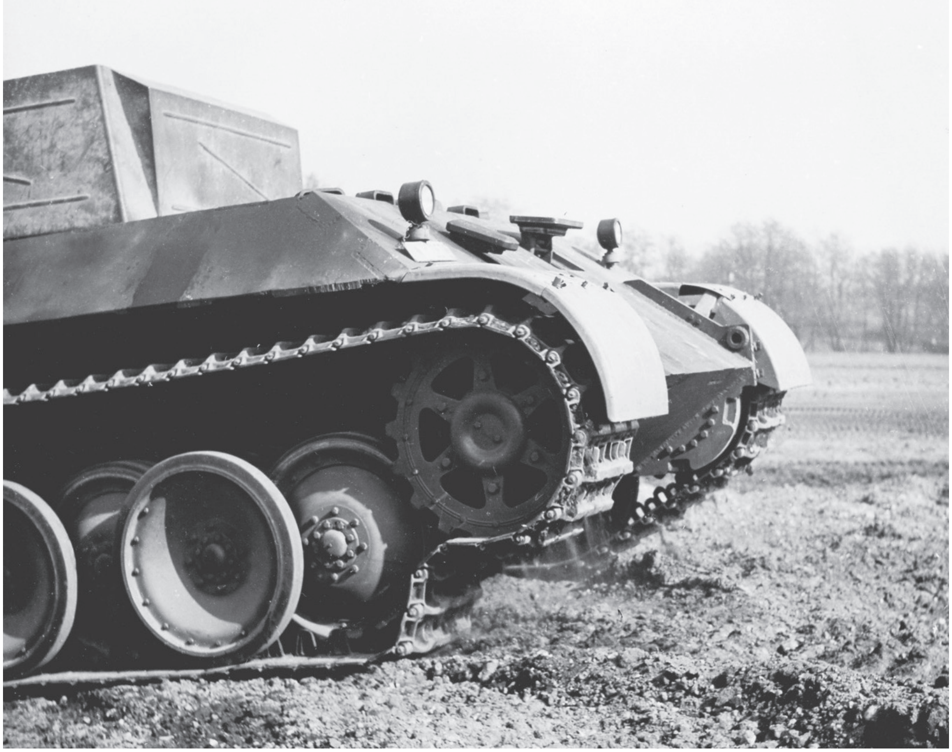


A wooden mock-up of a PzKpw Tiger Ausf E armed with the 7.5cm KwK 42 L/72, a similar turret, was also considered for the Panther. The design has some interesting details such as a side escape hatch and a MG mounting in the rear wall. (Historyfacts)



Above: A Panther of the early series production during road-running trials. The vehicle is fitted with a slave (equal weight) turret. The vehicle is fitted with the new type of main drive sprocket. (NARA)

Right: A track could easily be thrown when turning the tank, mainly due to incorrect tensioning of the track. (NARA)



helped minimize longitudinal pitching which gave the tank high stability as a weapons platform. Another benefit was fast cross-country speed, and a high average speed could be maintained on prepared road surfaces.

A very good distribution of weight along the tracks was achieved by having large, overlapping running wheels which also helped protect the hull from shell hits. The problem of the running gear becoming blocked by mud or snow was reduced to a minimum.

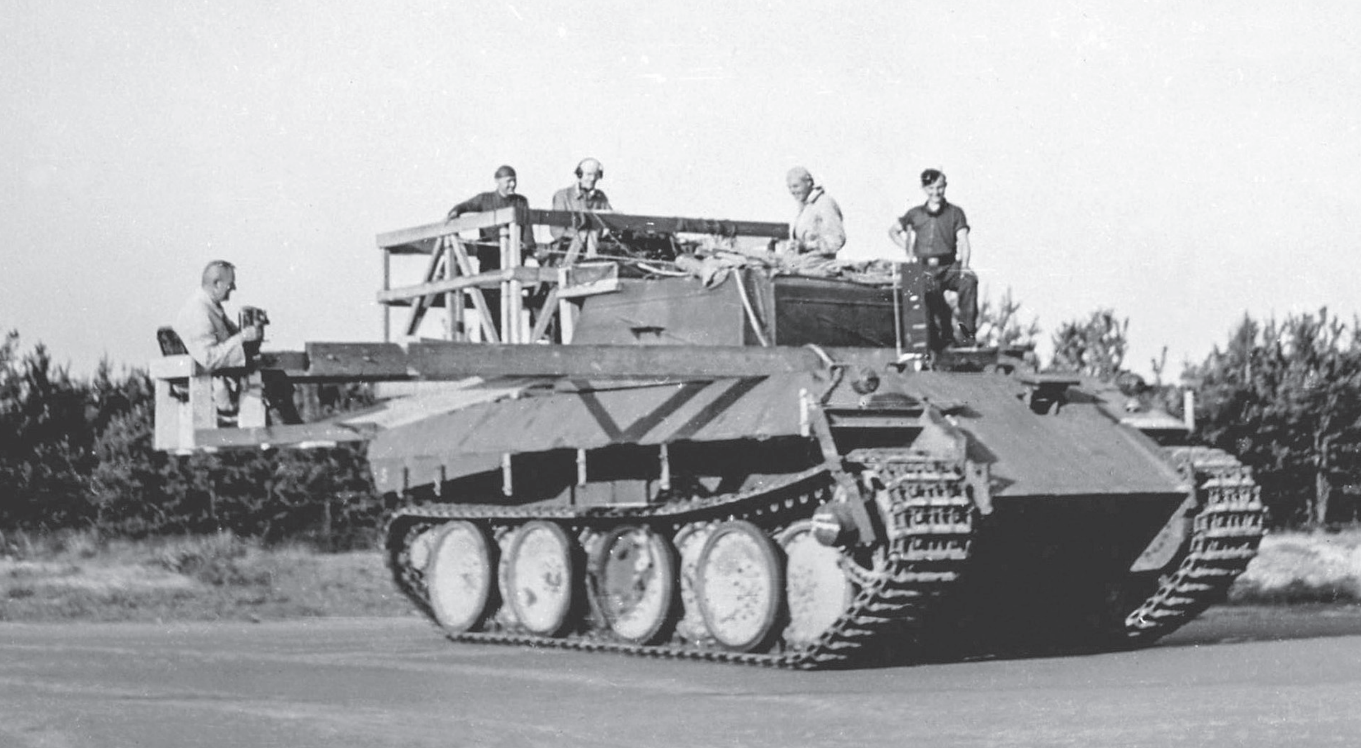
The few disadvantages appeared to be acceptable. Undoubtedly it was not very economical to manufacture, and repairs on the battlefront were also difficult. For example, in order to access one of the inner wheels, three adjacent wheels had to be removed.

It is striking that comparatively speaking the V1, the first pre-series Panther, performed the best. These early tanks had shock absorbers for the first and last road wheel. On series production vehicles these were moved to the second and seventh road wheel for reasons of space, with little or no effect on running.

When tested against the T-34 (an SU-122 was also tested), the Russian tank did surprisingly poorly.

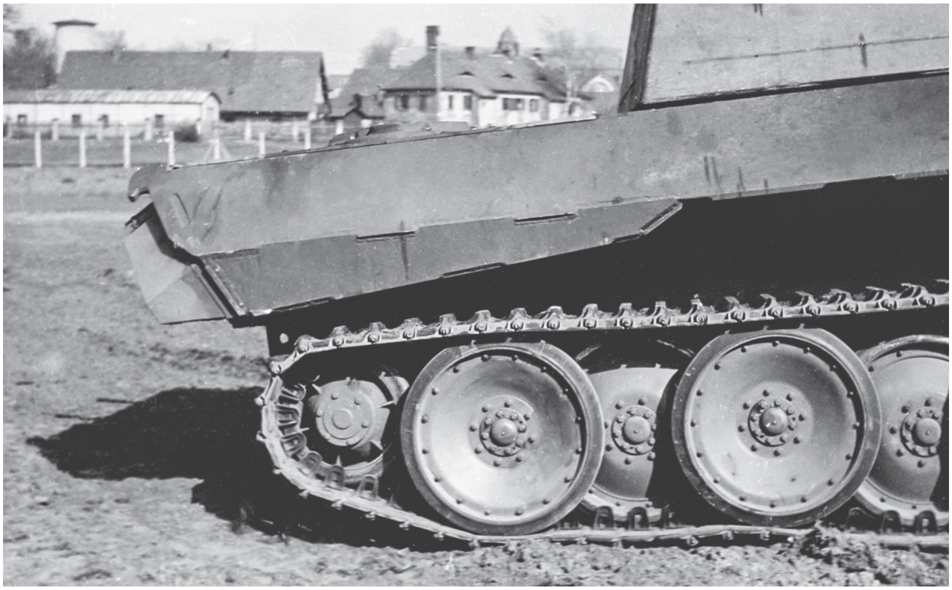
The Engine

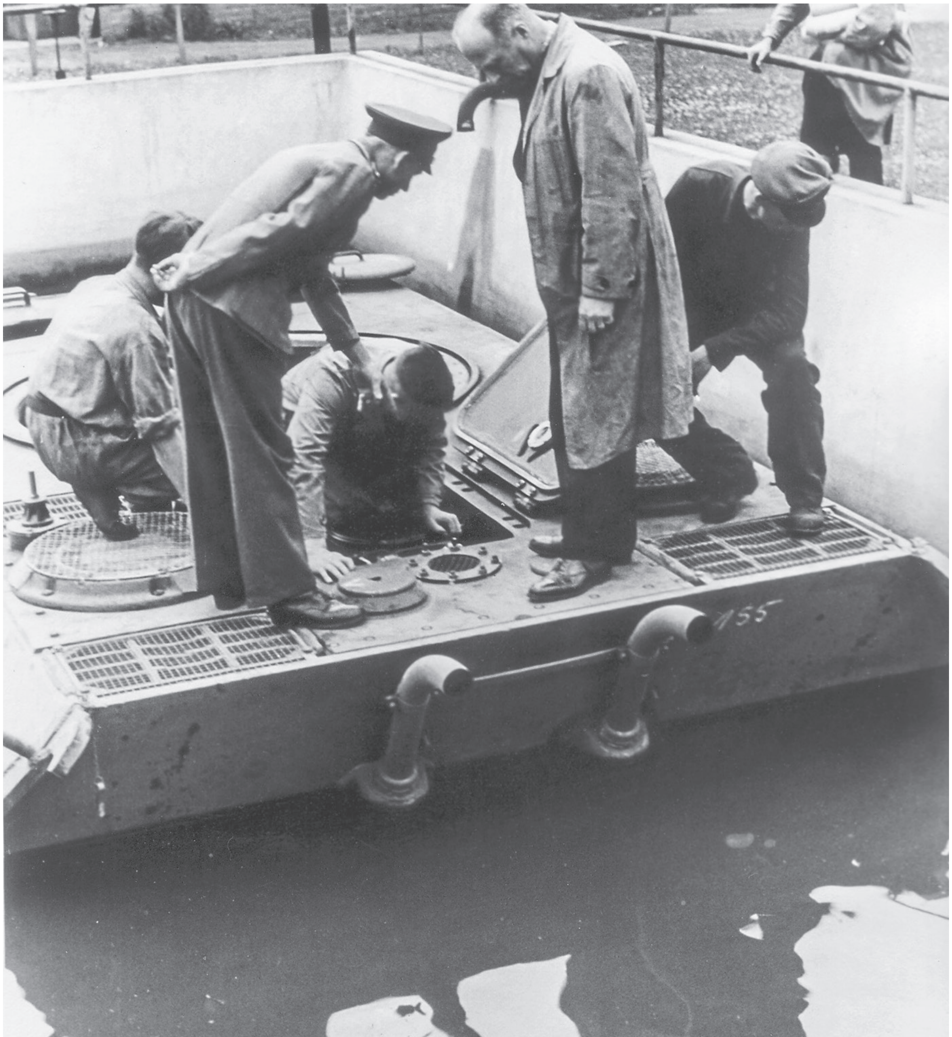
In the course of the VK.3002 (MAN) development a number of engines were considered. First the V-12 Maybach HL (*Hochleistungsmotor* – high-performance engine) 210 650hp engine was selected, this was already fitted



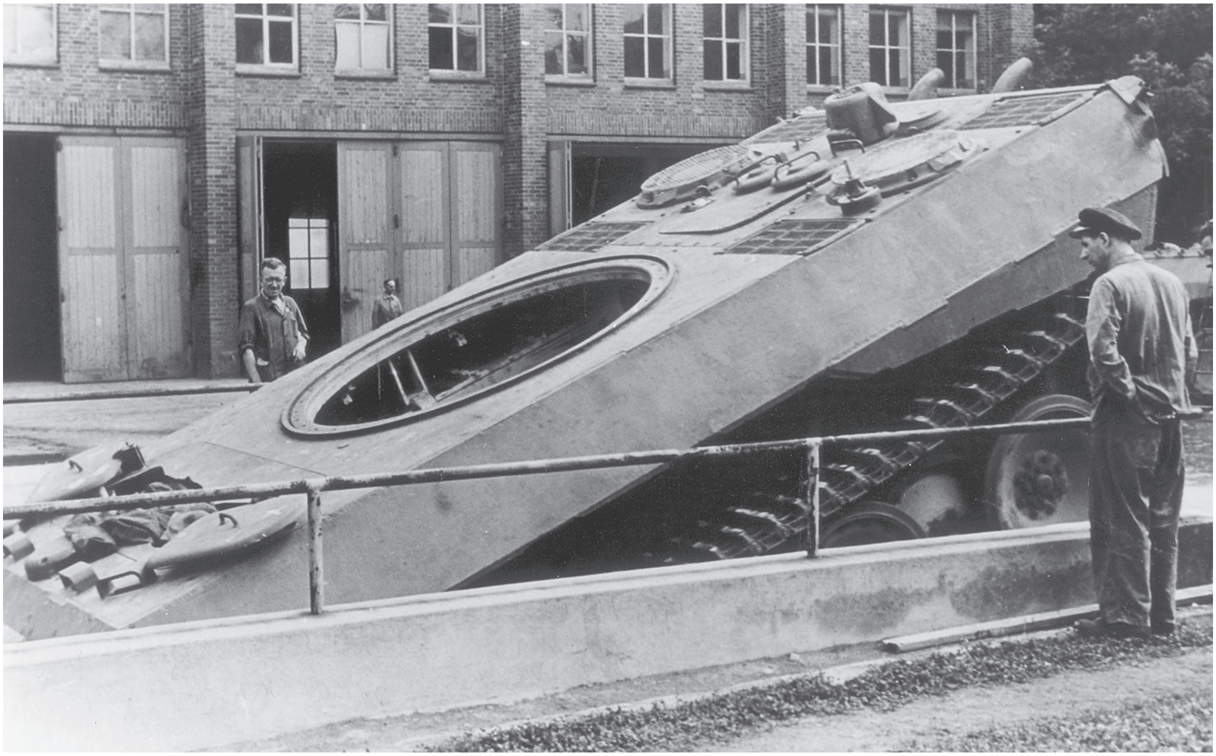
To measure the longitudinal pitch of the Panther chassis, extensive instrumentation was used, including a large outrigger to allow filming as part of the tests. The results were very good. (NARA)

To assist the road wheels with heavy loading, the torsion bar suspension was fitted with shock absorbers mounted inside the hull. (NARA)





Engineers examine the engine compartment while the tank is submerged to wading depth. (NARA)



A production-series chassis about to be tested for water-tightness in a water tank. The dome-shaped cover, (to prevent water ingress), for the air intake is visible to the rear of the engine deck. (NARA)

in the first production PzKpfw VI Tiger Ausf E provided valuable performance data. For the intended combat weight of 36t, a power/weight ratio of 18hp/t had been the aim, an outstanding ratio which exceeded the T-34. Because the first prototype vehicles weighed over 45t, the power/weight ratio was reduced to 14.5hp/t.

During the first running trials a number of problems arose; if a driver frequently over-revved an engine it rapidly overheated – the cause of many catastrophic failures.

After 250 Maybach HL 210-engined Panthers had been completed it was decided to instal the more powerful V-12 Maybach HL 230 P30. The engine block for the HL 210 had been cast aluminium, that for the P30 was made from more robust cast iron. The 23,000cc Maybach HL 230 P30 output was 700hp. The PzKpfw VI Tiger was to be fitted with the more powerful HL 230 P45.

The more efficient HL 230 P30 engine gave a slightly higher power/weight ratio (15.5hp/t), but had better torque output at lower revolutions. This gave an improvement in acceleration and driving up inclines, but road performance remained unchanged.

On 23 October 1943 it was ordered that in future only two engines for tanks were to remain in production; the 265hp Maybach HL 120 for PzKpfw III and IV, and the 700hp HL 230 for the PzKpfw Tiger and Panther. The HL 210 was removed from production. This was easy to introduce, but the production of an economical diesel engine for tanks remained a distant project.

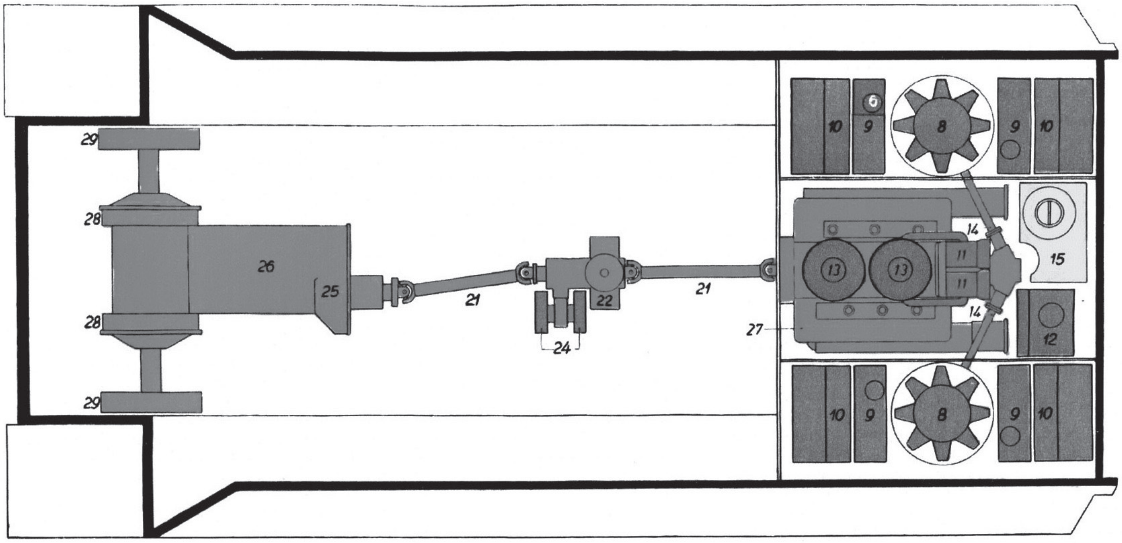
Transmission

During the development of the Panther and Tiger, designers and manufacturers of the gearbox were confronted by certain problems. Both the power output of the engine and the combat weight of the vehicle posed a challenge. In 1942, when planning of the PzKpfw VI Tiger Ausf E began it was decided to fit the then revolutionary Maybach Olvar eight-speed pre-selector gearbox. It was unprecedentedly light to operate; the driver – without releasing the accelerator – selected a gear and the semi-automatic system then made the change.

For the Panther a seven-speed synchromesh manual gearbox manufactured by Zahnradfabrik Friedrichshafen (ZF) was chosen. The decision for a gearbox of much simpler construction was expected to lead to more reliability in practice, an argument not to be underestimated.

Guderian himself demanded repeatedly that the Olvar gearbox be installed in the Panther. He argued that a decisive factor was that when a tank was in action, a semi-automatic system removed much of the burden on an often young and inexperienced driver. Because this was not technically possible, a good advice note was distributed detailing a 'sparing manner of proceeding' in connection with the recent PzKpfw VI Tiger Ausf E:

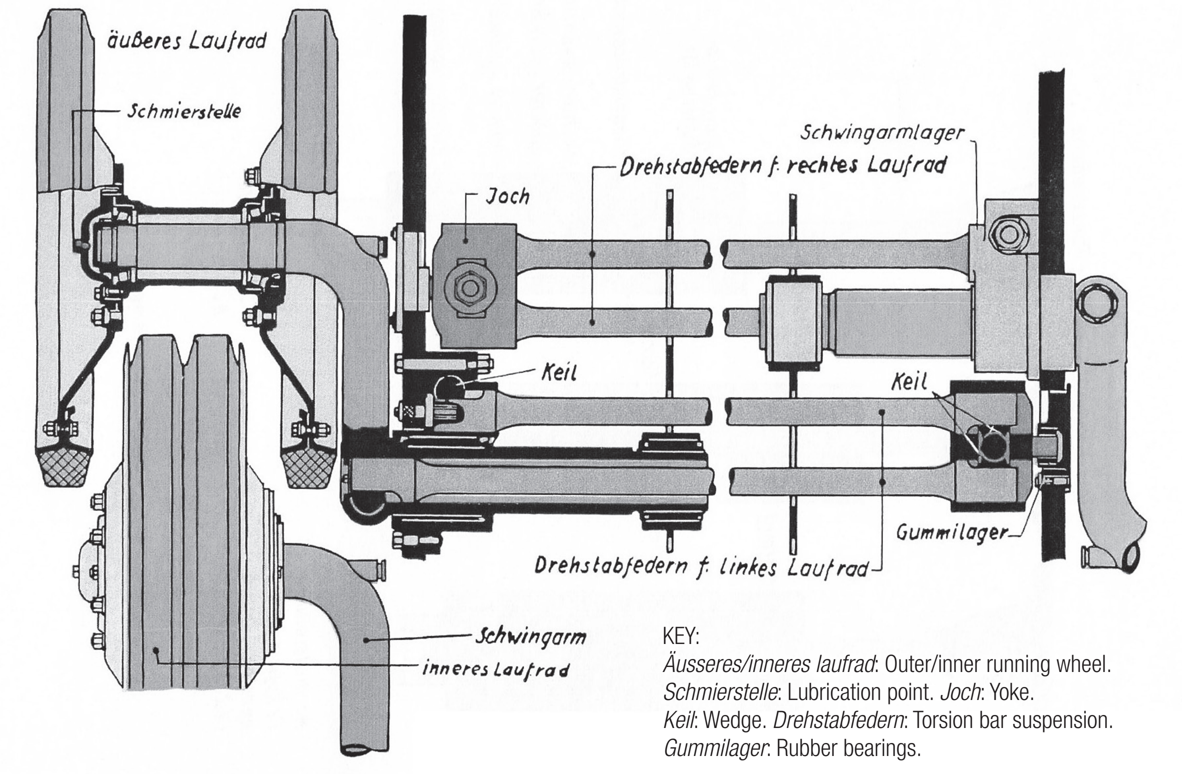
A schematic drawing showing the mechanical components in a Panther. The engine was isolated from the cooling system in a sealed compartment. Most of the fuel was carried in four tanks under the cooling system. (D655-5)



KEY:
6: Oil cooler for the gearbox and steering. 8: Engine-cooling fan. 9: Radiator. 10: Air pipes.
11: Ignition magneto. 12: Cooling water equalizer tank. 13: Air filter. 14: Fan drive shaft.
15: Fuel tank. 21: Cardan shaft. 22: Turret turntable motor. 24: Oil pumps. 25: Main coupling.
26. Gearbox. 27: Engine 28. Steering system. 29: Steering brakes.

> File note on the Special Tank Commission meeting at Kummersdorf on 14 July 1942, regarding the testing of the Tiger tank. At my suggestion it was agreed:
>
> a) The Tiger must be ready for combat, at the latest, by September this year.
> b) A sparing manner of proceeding is to be used: obviously one can – also in other areas – make too great demands of any vehicle (e.g. including the most valuable motor cars) which in a short time become unusable.
> c) As use in France is foreseen and the unfavourable Russian circumstances no longer apply, these changed conditions should be taken into account during vehicle tests.
> d) The heaviest Russian tank (52t) is to be subjected to endurance testing under the same operating conditions. From these trials it will be possible to confirm that mechanically even the Russian tank will not be able to meet the highest operational demands.

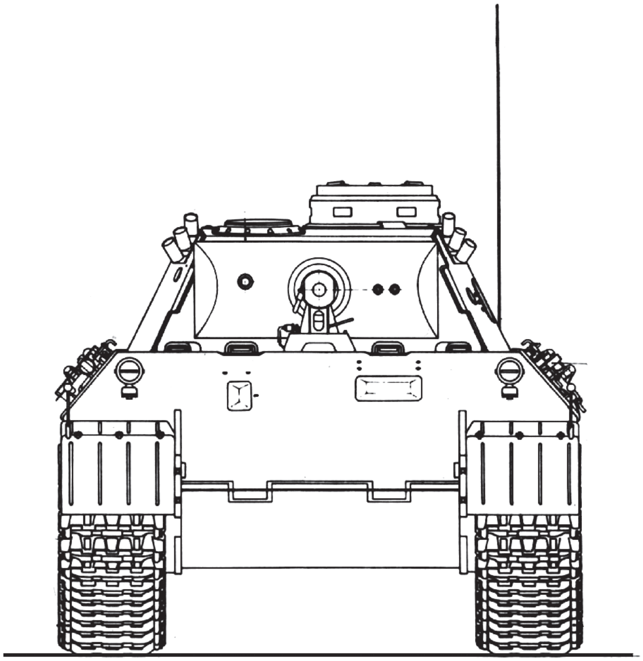
In later operations it was found that the stability of the vehicle – smooth gear changes and steering – depended on the ability of the driver. The training of drivers in its turn suffered from a shortage of fuel and Panthers at driving school; a situation which did not improve significantly during the war. Front-line units were forced to train drivers locally which, all too often, proved impossible.

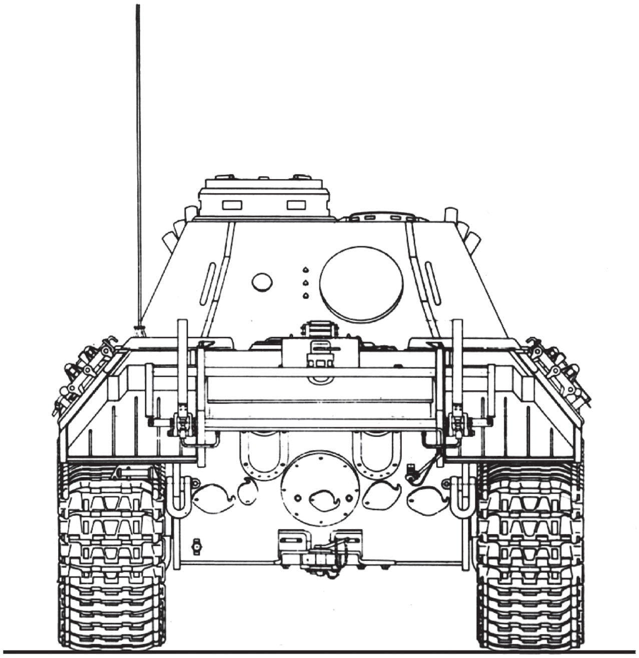

äußeres Laufrad
Schmierstelle
Schwingarmlager
Drehstabfedern f. rechtes Laufrad
Joch
Keil
Keil
Gummilager
Drehstabfedern f. linkes Laufrad
Schwingarm
inneres Laufrad

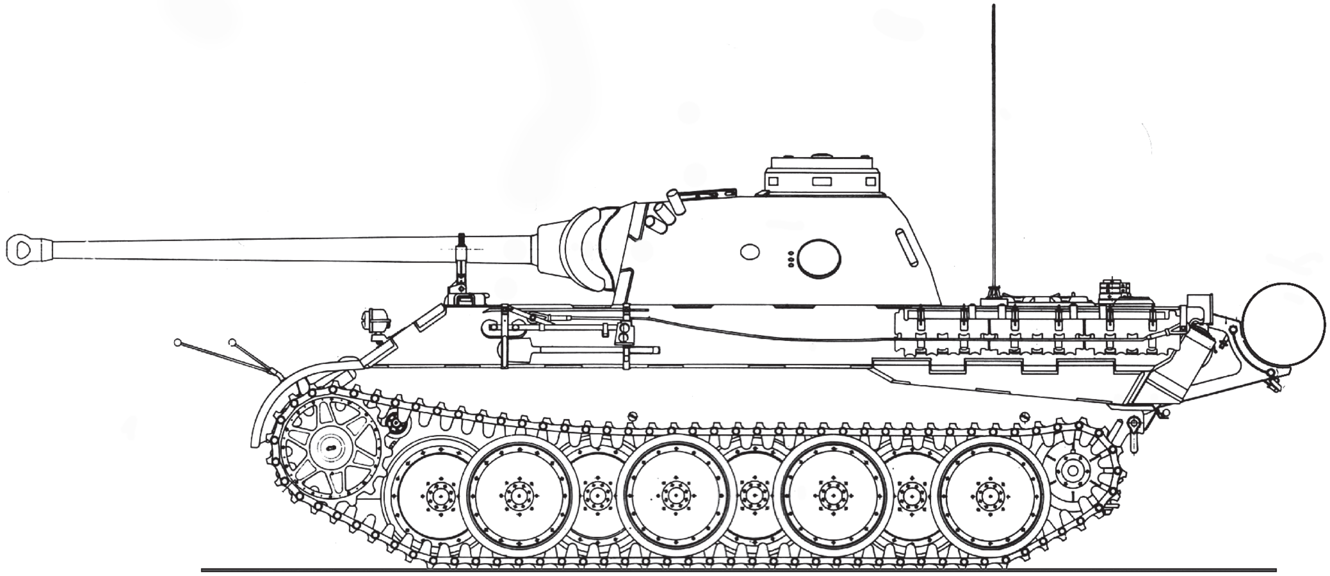
KEY:
Äusseres/inneres laufrad: Outer/inner running wheel.
Schmierstelle: Lubrication point. *Joch*: Yoke.
Keil: Wedge. *Drehstabfedern*: Torsion bar suspension.
Gummilager: Rubber bearings.

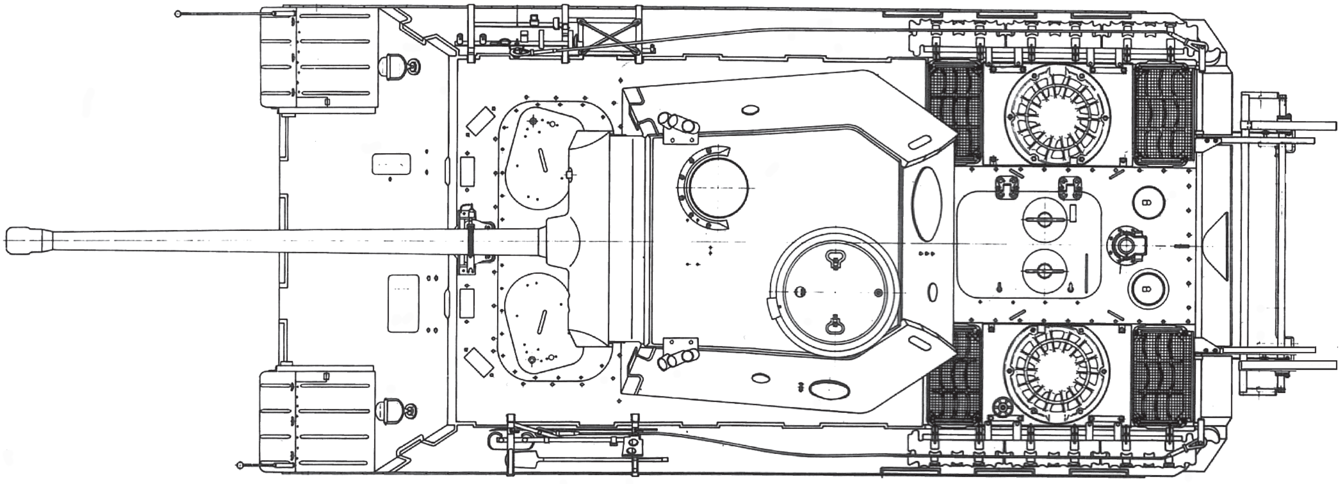
A schematic of the double torsion bar suspension and the arrangement of the road wheels. (D-655-5)

General arrangement drawings of the Panther Ausf D. Some details such as the horizontally-mounted exhaust and the single chamber muzzle brake were used only on the prototypes. It cannot be confirmed that the mounting brackets for two 200ltr barrels were ever used on the Panther, but probably were on the tank recovery version. (Anderson)

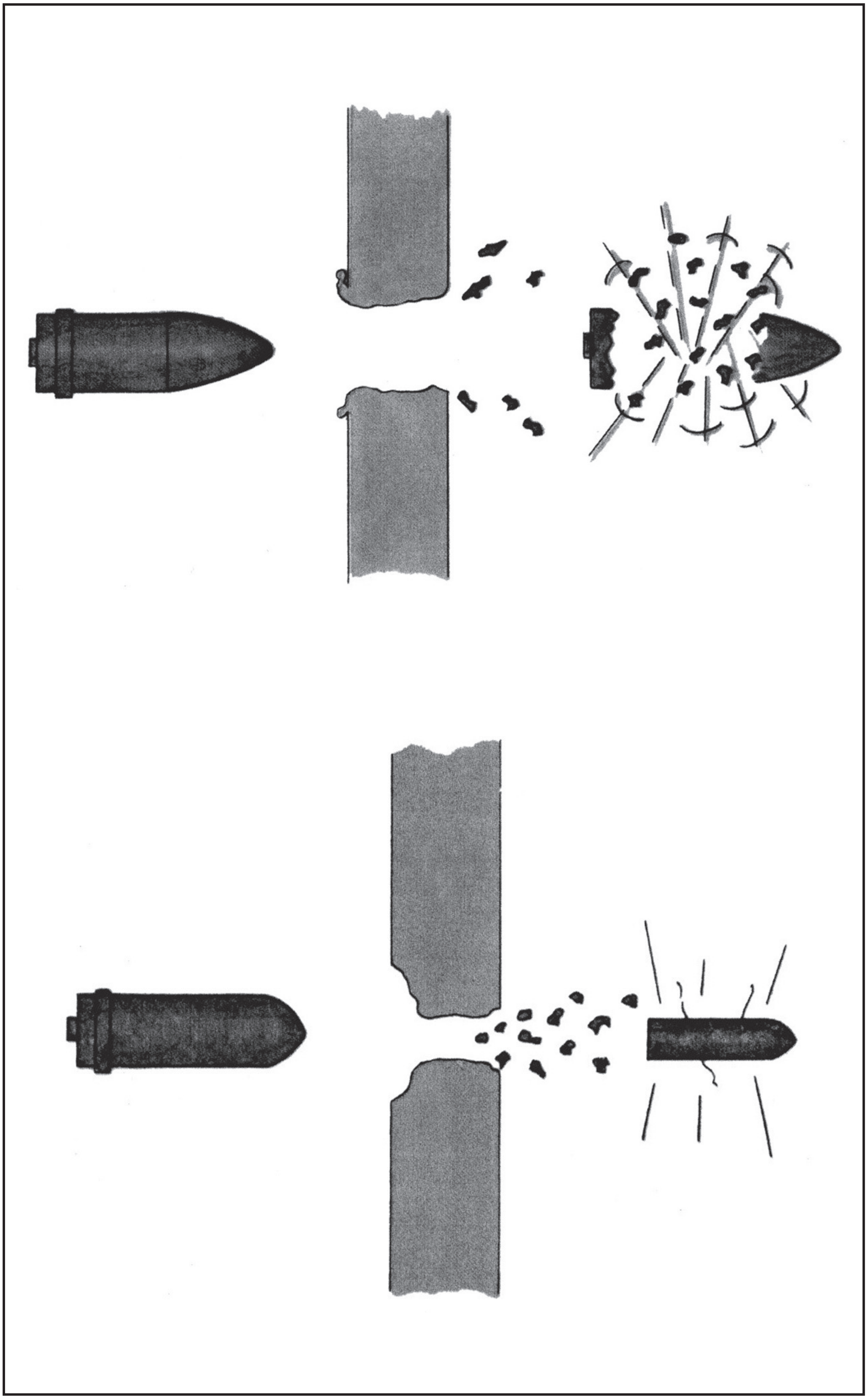




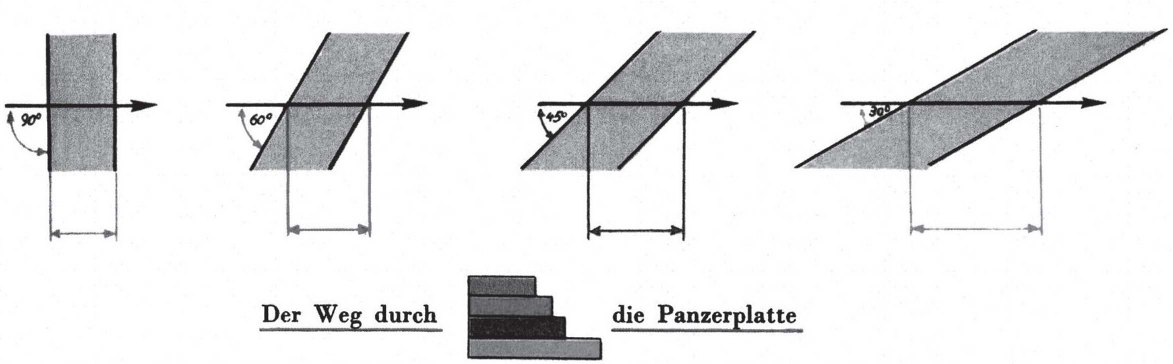




The graphics show the effect of an AP shell. (Top right) Ideally, the armour is fully penetrated and the explosive charge detonates behind the armour with a devastating splinter effect. (bottom right) The hard-core shell penetrates even thicker armour with a high degree of probability by virtue of the high muzzle velocity and the small tungsten core. Splinter development is much less. (HDV 470/19).



Penetrating armour plating
The lesser the angle at which an armour-piercing (AP) shell hits the armour plating, the longer the path through it.



An AP shell (at a small angle of impact) often will not penetrate the armour plate because of the distance it has to travel, while it can cover the shorter distance of the greater angle of impact.

The penetrative force of a tank shell depends on the angle of impact and thus the path through the armour. Sloping armour or any inclined angle influenced this considerably.
(HDv 470/19)

There is an article on this subject in the June 1944 edition of *Nachrichtenblatt der Panzertruppen* (News sheet: Armoured troops):

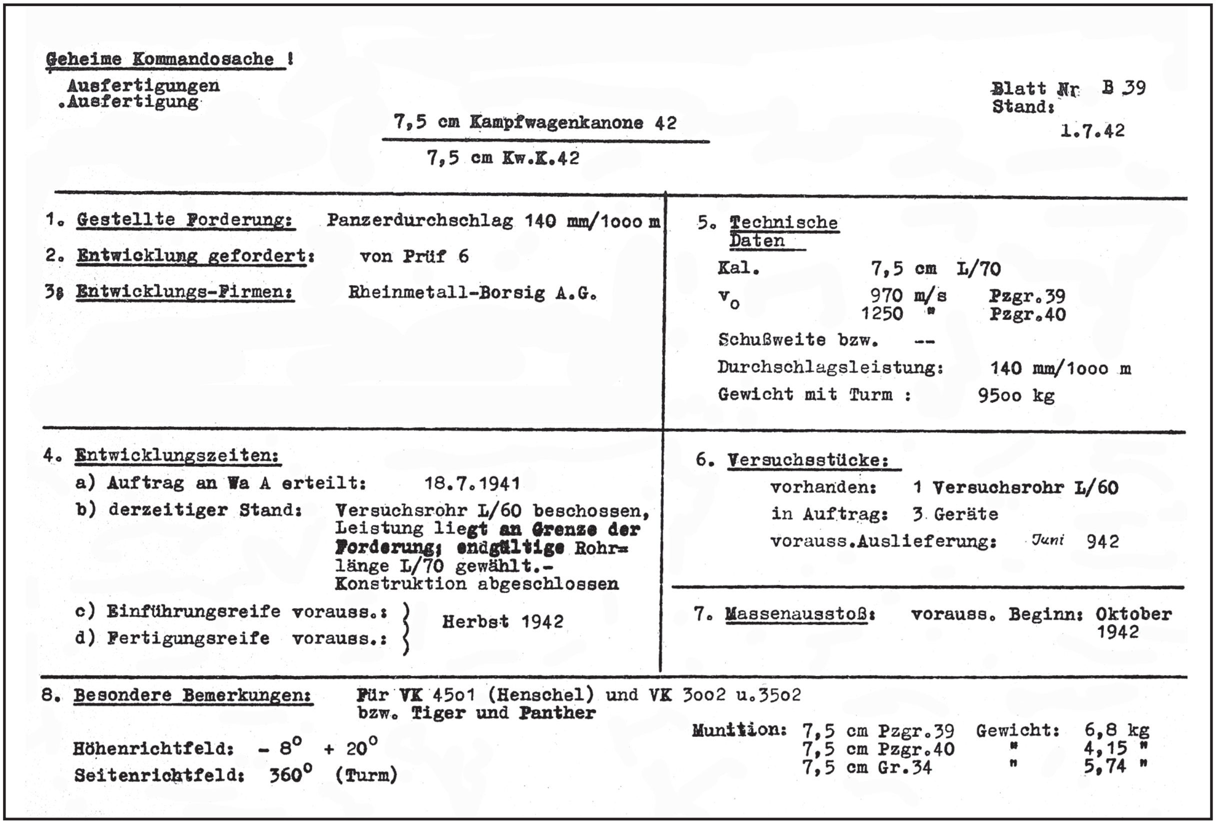
> Performance of a Panther-recovery tank driver.
> *Unteroffizier* Krause of a Panther workshop platoon has up to 3 May 1944 driven his Panther recovery tank – Chassis No. 212132 – 4,200km without an engine change or damage to the transmission, including the final drive units, gearbox and drive shaft. Approximately 1,000km of this was made towing a Panther tank. The vehicle and engine are still in excellent condition and continue to be operational.

Armour

The hull of the PzKpfw V Panther was fabricated from seam-welded armoured steel. Frontal armour was 80mm thick and sloped at 55°. Side and rear armour was 40mm thick and sloped at 35°. The turret front was 80mm (this remained unchanged throughout service) and the sides 45mm thick. The hull sides were 40mm thick but did not offer good protection against fire from Soviet 7.62cm guns at normal fighting ranges. The armour on the turret top and the roof of the hull were also criticized for being too thin.

Firepower – The 7.5cm KwK 42 L/70

In July 1941, *Waffenprüfämet* (WaPrüf – Army Weapons Office) 6, in an attempt to achieve battlefield superiority, contracted Rheinmetall-Borsig to develop a high-performance gun of L/60 calibre length capable of penetrating 140mm



Geheime Kommandosache !

Ausfertigungen
.Ausfertigung

Blatt Nr B 39
Stand:
1.7.42

7,5 cm Kampfwagenkanone 42

7,5 cm Kw.K.42

1. **Gestellte Forderung:** Panzerdurchschlag 140 mm/1000 m
2. **Entwicklung gefordert:** von Prüf 6
3. **Entwicklungs-Firmen:** Rheinmetall-Borsig A.G.

5. **Technische Daten**

Kal. 7,5 cm L/70
v_0 970 m/s Pzgr.39
1250 " Pzgr.40
Schußweite bzw. --
Durchschlagsleistung: 140 mm/1000 m
Gewicht mit Turm : 9500 kg

4. **Entwicklungszeiten:**
   a) Auftrag an Wa A erteilt: 18.7.1941
   b) derzeitiger Stand: Versuchsrohr L/60 beschossen, Leistung liegt an Grenze der Forderung; endgültige Rohrlänge L/70 gewählt.- Konstruktion abgeschlossen
   c) Einführungsreife vorauss.: } Herbst 1942
   d) Fertigungsreife vorauss.: }

6. **Versuchsstücke:**

vorhanden: 1 Versuchsrohr L/60
in Auftrag: 3 Geräte
vorauss.Auslieferung: Juni 942

7. **Massenausstoß:** vorauss. Beginn: Oktober 1942

8. **Besondere Bemerkungen:** Für VK 4501 (Henschel) und VK 3002 u.3502 bzw. Tiger und Panther

Höhenrichtfeld: - 8° + 20°
Seitenrichtfeld: 360° (Turm)

Munition:	7,5 cm Pzgr.39	Gewicht:	6,8 kg
	7,5 cm Pzgr.40	"	4,15 "
	7,5 cm Gr.34	"	5,74 "

Report on the development stage of the 7.5cm KwK 42 dated 1 July 1942. During the period of the report the nomenclature of the ammunition changed. (NARA)

armour at 1,000m. After test firing an experimental L/60 it was noted that its performance was barely sufficient. As a result WaPrüf 6 issued a requirement for an L/70 calibre length gun capable of firing the KwK 40 shell which had a more powerful propellant. Due to the excellent ballistic performance of the gun (high muzzle velocity) it was decided not to use the hollow-charge ammunition. The 7.5cm KwK 42 L/70 gun was chosen for the development of the VK.3002. In spring 1942, consideration was given to mounting the 7.5cm KwK 42 L/70 in the VK.4501 (Henschel Tiger), but this did not happen; the production PzKpfw VI Tiger mounted a Krupp-manufactured 8.8cm KwK 36 L/56.

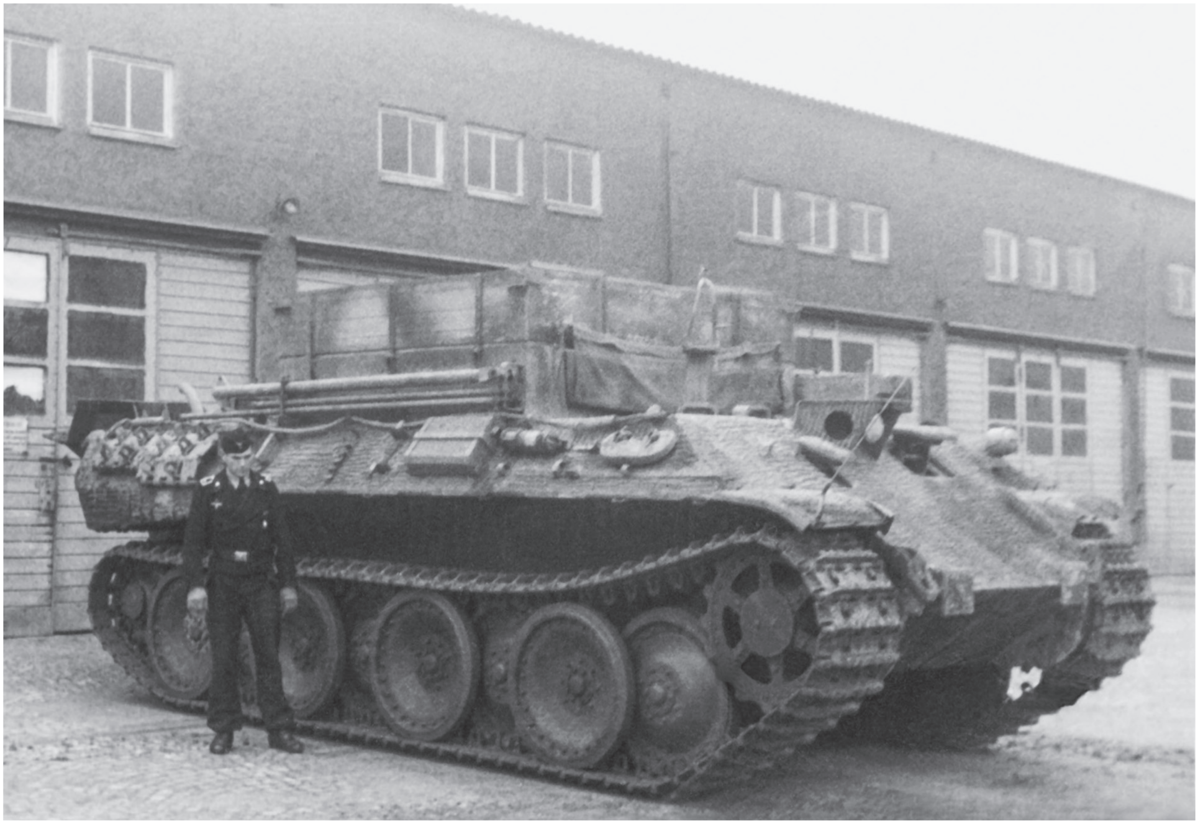
Three types of shell were available for the 7.5cm KwK 42 L/70:

7.5cm PzGrPatr 39/42

The 7.5cm *Panzergranatpatrone* (PzGrPatr) 39/42 standard anti-tank ammunition, was a very powerful shell with compressed explosive charge and ballistic cap. Muzzle velocity was 925m/sec, the trajectory of the shell was made visible by a 2sec burn of tracer.

7.5cm PzGrPatr 40/42

For engaging difficult-to-defeat enemy tanks, this hard-core shell had excellent



A newly delivered, fully equipped and ready-for-action *Bergepanther* (SdKfz 179) parked at a tank depot in August 1943. (Hoppe)

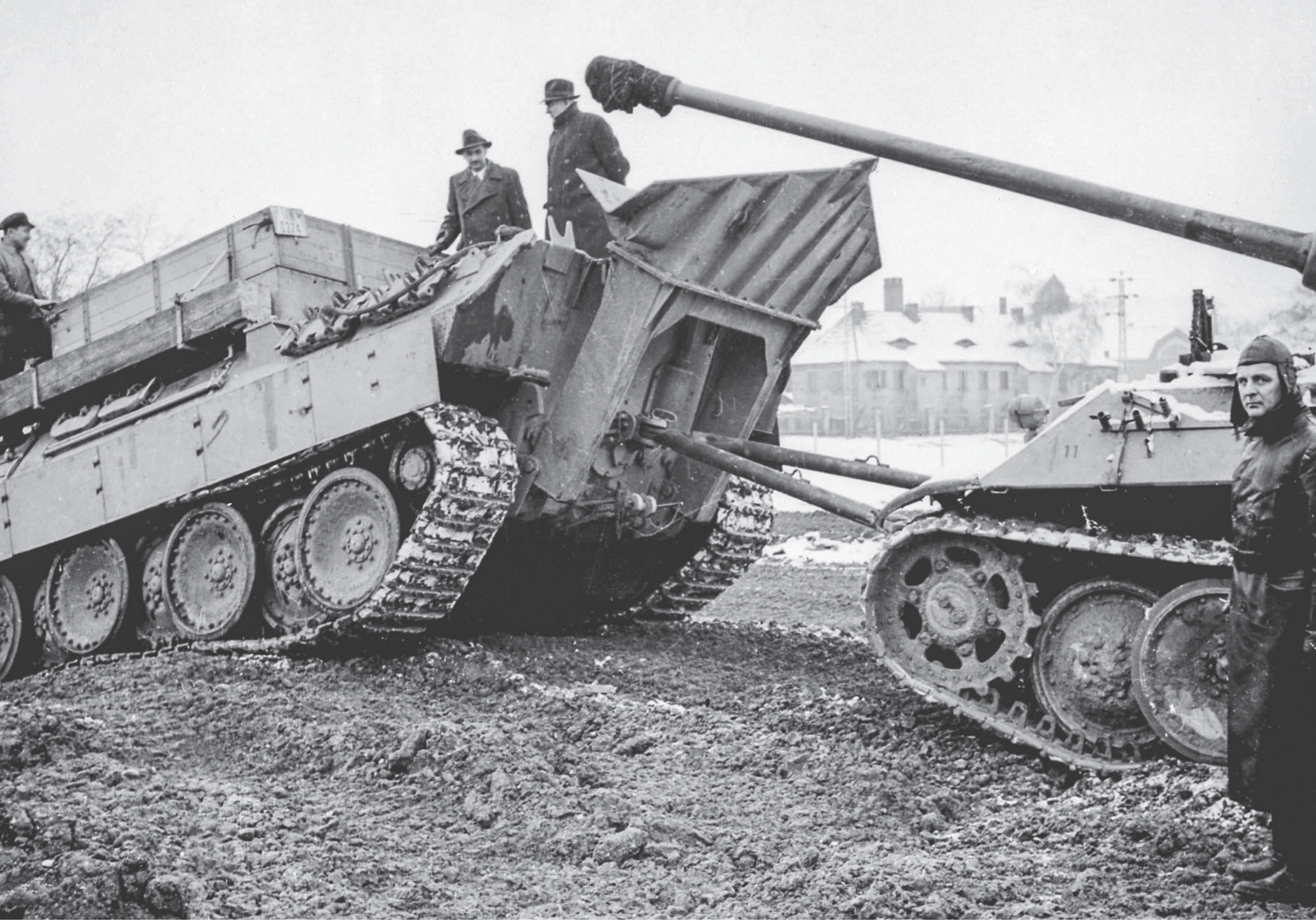
armour penetration capability due to a muzzle velocity of 1,070m/sec. As a result of the shortage of Wolfram (tungsten), this ammunition was only used for emergency situations. The trajectory of the shell was made visible by a 5sec burn of tracer.

7.5cm SprGrPatr 42

The 7.5cm *Sprenggranatpatrone* (SprGrPatr) 42 (shell with explosive grenade) was used against soft and semi-hardened targets. The impact fuze could be used with or without time-delay. At low angle of impact a ricochet was possible, and the shell detonated above or behind a target. A high angle of impact was to achieve a mine effect aimed at destroying fortified positions and trenches. If AP munition was not available, this shell could also be used for engaging enemy tanks. The trajectory of the shell was made visible by a burn of tracer.

Secondary Armament

Two machine guns were carried for self defence; a 7.92mm *Maschinengewehr* (MG) 34 was mounted in the front of the hull ahead of the wireless operator and fired through a port after opening a simple armoured flap. On later versions a more effective ball-type mounting was used. The other MG 34 was installed on the right-hand side of the main gun.



Civilian engineers standing on the engine deck of a *Bergepanther* observe towing trials using a PzKpfw V Panther as the vehicle to be recovered. The towing bars could be used in a staggered arrangement. (NARA)

Other Defensive Devices

Smoke-candle launchers were mounted on the sides of the turret to provide a smoke screen during recovery or retreat. The equipment was mounted as standard equipment on all production Panther Ausf Ds. However, the launchers were easily damaged and the candles could be ignited by enemy fire so they were not fitted after mid-1943. In 1944, a fully-rotatable grenade launcher was developed as a close-defence weapon and fitted to a variety of vehicles. On a Panther the compact weapon was mounted in the roof of the turret and fired smoke or shrapnel grenades. These exploded above the tank to provide smoke cover or deter enemy anti-tank troops.

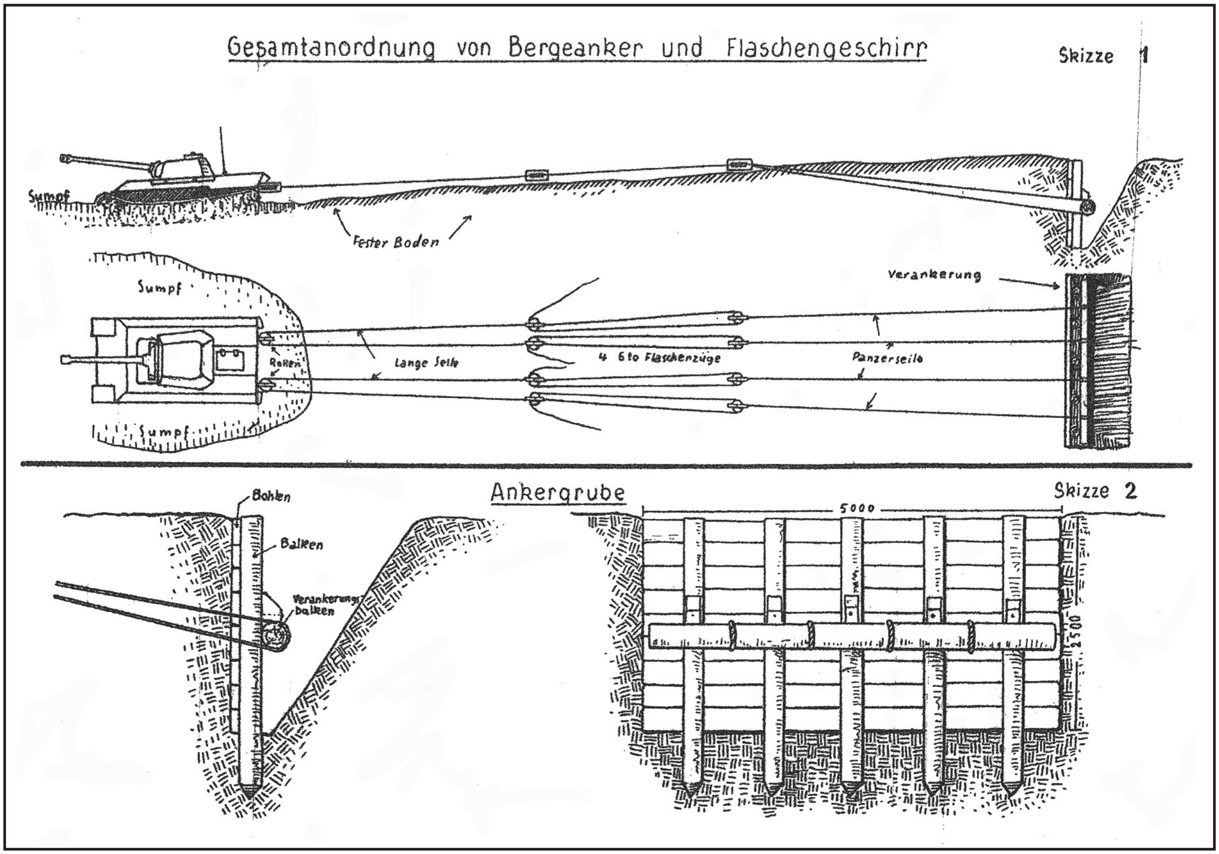
An Armoured Recovery Tank

Armoured vehicles require special care to guarantee operational readiness. Relative to the special circumstances of battlefield operations, especially during unfavourable weather conditions, such as the Russian mud period or winter, breakdowns become everyday routine for the engineer platoons.

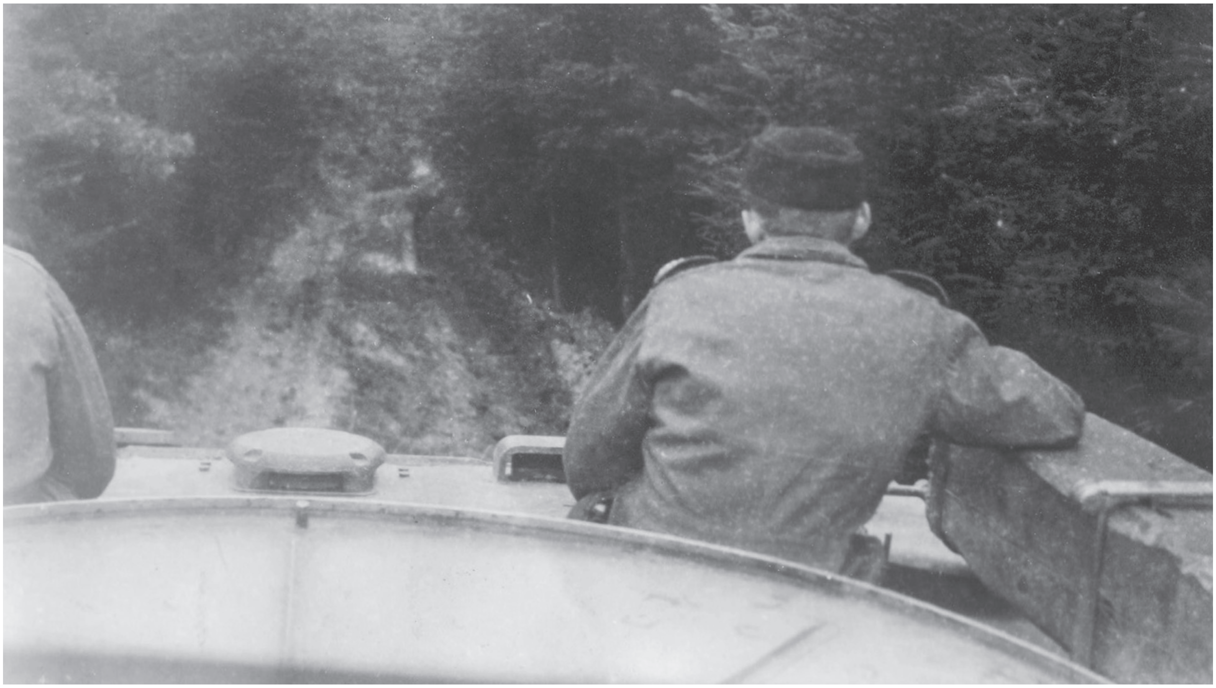
If a failed vehicle could not be repaired in the field, then it would have to be transported to the nearest workshop.

Initially tank divisions were equipped with the Famo-built heavy tractor units – *schwere Zugkraftwagen* (s ZgKw – heavy half-tracked tractor) 18t (SdKfz 9) – to recover failed or damaged PzKpfw III and IV tanks. The Sdkfz 9 was fitted with an excellent recovery winch and was sufficiently powerful to tow a failed tank. For transport over longer distances the failed tank would be loaded on a *Sonderanhänger* (SdAnh – special-purpose trailer) 116. But the trailer could only carry a 20 to 22t payload and used on nothing but hard-surfaced roads. In the Soviet Union it became obvious that the SdAnh 116 could not be used in the bottomless mud of the *Rasputitsa* season or the deep snow in winter.

When the PzKpfw VI Tiger Ausf E heavy tank entered service towards the end of 1942, recovery crews were faced with a serious problem: there were no tractor vehicles available powerful enough to tow a 56t tank. As noted in *Kriegsstärkenachweisungen* (KStN – war strength inventories), specially formed tank recovery companies were to have been equipped with the 35t heavy recovery tractor (SdKfz 20), but none were ever built. As a substitute, also according to KStN, these companies were to receive some

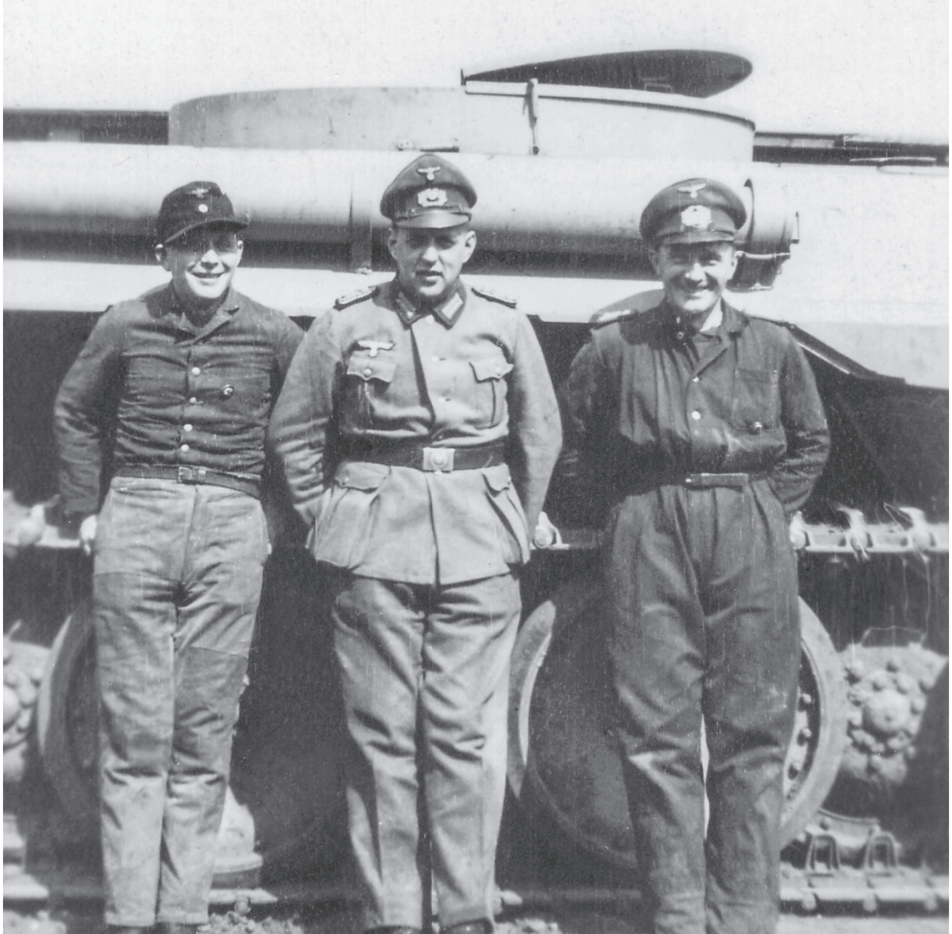

Gesamtanordnung von Bergeanker und Flaschengeschirr
Skizze 1
Sumpf
Fester Boden
Verankerung
Sumpf
Rollen
Lange Seile
4 6to Flaschenzüge
Panzerseile
Sumpf
Ankergrube
Skizze 2
Bohlen
Balken
Verankerungsbalken
5000
1500

A drawing from the *Nachrichtenblatt der Panzertruppen* shows how to improvise an anchor for the recovery of a tank bogged-down in marshy terrain. Depending on the ground conditions, this anchor had a holding power of between 20 and 40t. The 6-ton capacity pulley blocks were coupled to the winches of *schweres Zugkraftwagen* (s ZgKw) 18t heavy recovery tractors. (NARA)



Above:
A *Bergepanther* hull travelling along a forest track. The wireless operator is seated in the open hatch and leaning against one of the massive recovery beams. The turret opening is visible. (Anderson)

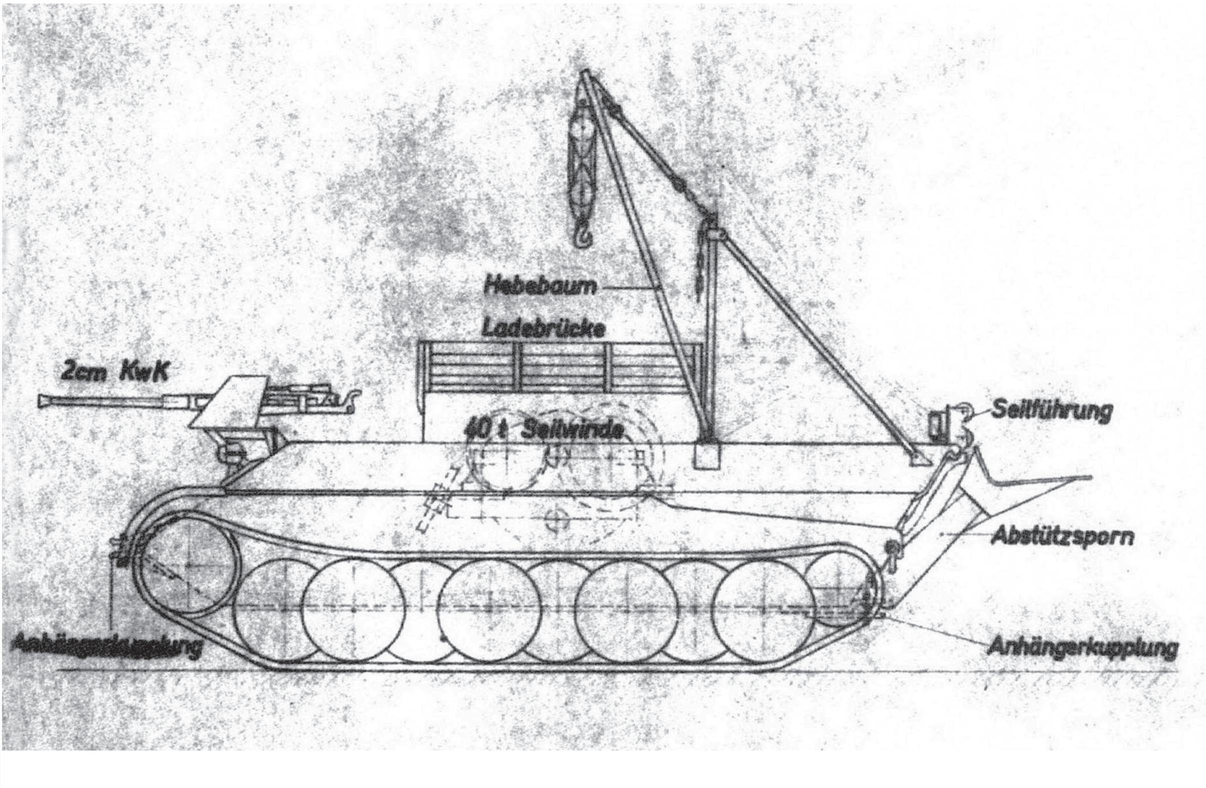
Right:
The first *Bergepanther* basically used a turretless Panther hull and chassis with the opening to the fighting compartment fitted with a steel cover. No brackets for mounting recovery equipment are fitted. (Anderson)



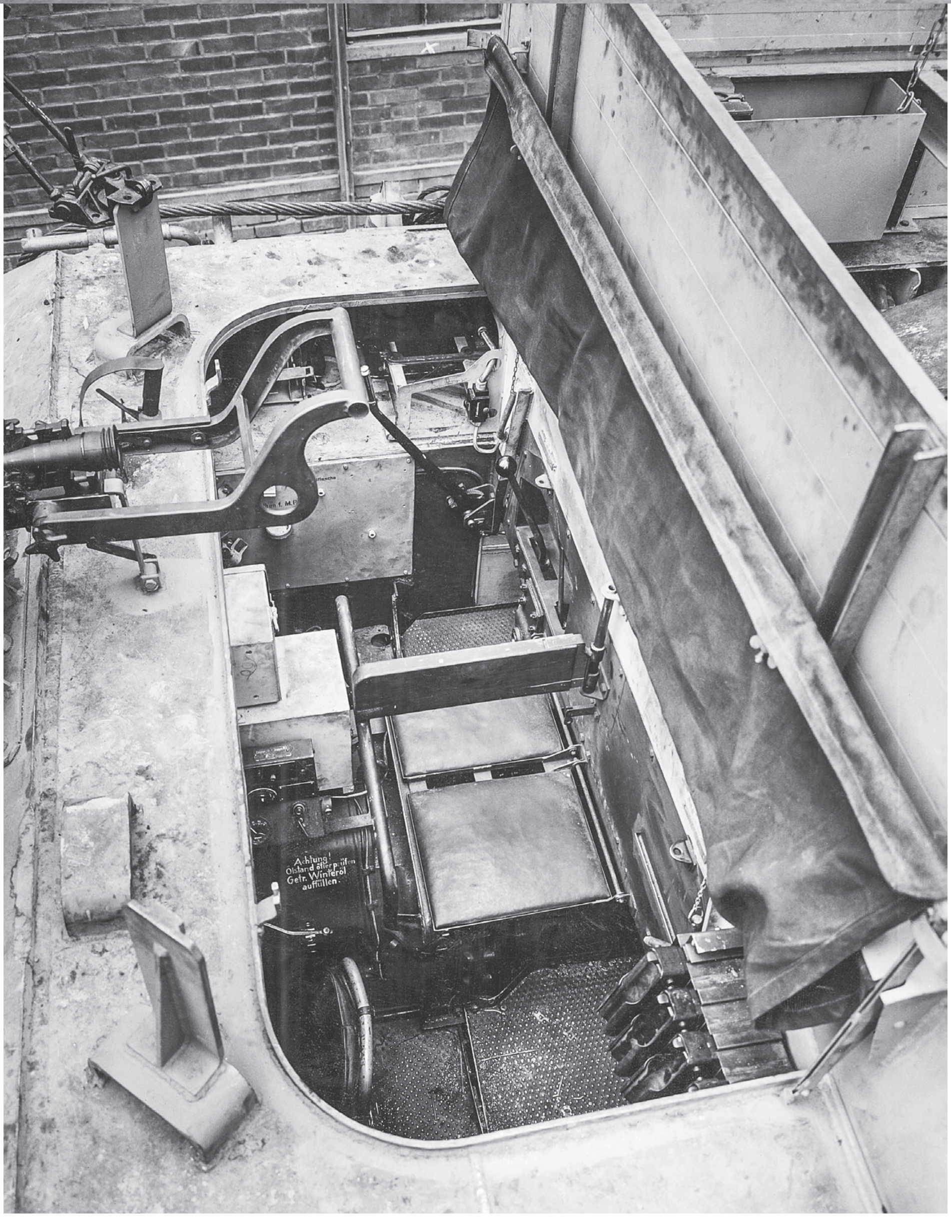
T-34 or KV-1 tanks converted for towing, or the SdKfz 9 heavy half-track tractor. (This is how captured material was officially noted in the German war strength listings.) German forces were forbidden to use their own tank to tow a failed tank in order to prevent further breakdowns.

From a technical point of view the recovery and transport of an immobilized tank was achievable in most situations, but under enemy fire on a battlefield it was unsafe to use soft-skinned tractors to carry out a recovery mission. A report by Major Dipl Ing. Lanig highlights the problem:

> The recovery tank *Bergepanther*
>
> The development of this vehicle was necessary as our tanks become heavier due to the extra armour fitted to protect against increasingly effective of enemy guns. The weight of the latest tanks has already exceeded 60t. The retrieval of such heavy vehicles, damaged by enemy action or bogged-down in difficult terrain, makes great demands on our recovery equipment. To recover a tank, cross-country vehicles, mainly half-track tractor units or even another tank could be used, as long as:
> 1.) They have sufficient power to tow out an immobilized tank.
> 2.) They can use an inbuilt winch and hawser or windlass installation powerful

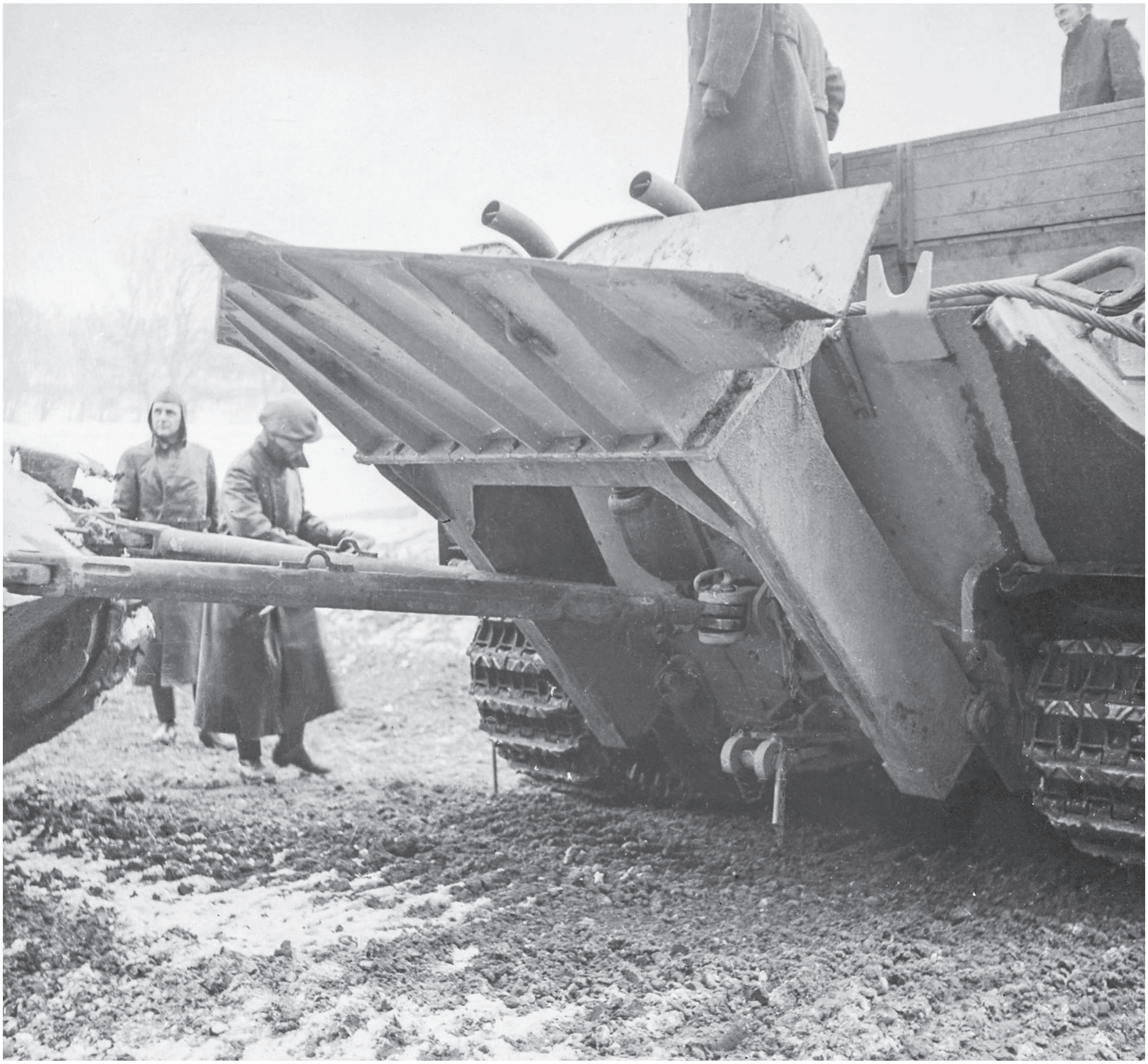


A sketch of the *Bergepanther* shows the 40-ton capacity winch installed in the centre of the interior, and the tail spade. The derrick could be mounted on either side of the loading deck. Other than a 7.92mm MG 34 for self defence a 2cm KwK 30 could be fitted, but the mounting was not installed on all vehicles. Contemporary photographs showing this gun are very rare. (NARA)



The original cover plate over the radio operator and driver was removed, and replaced with a folding tarpaulin for protection against the weather. The centrally mounted 2cm KwK 30 is partially visible. A simple mounting plate for a machine gun was welded on each cover for outer periscopes. (BA/MA)

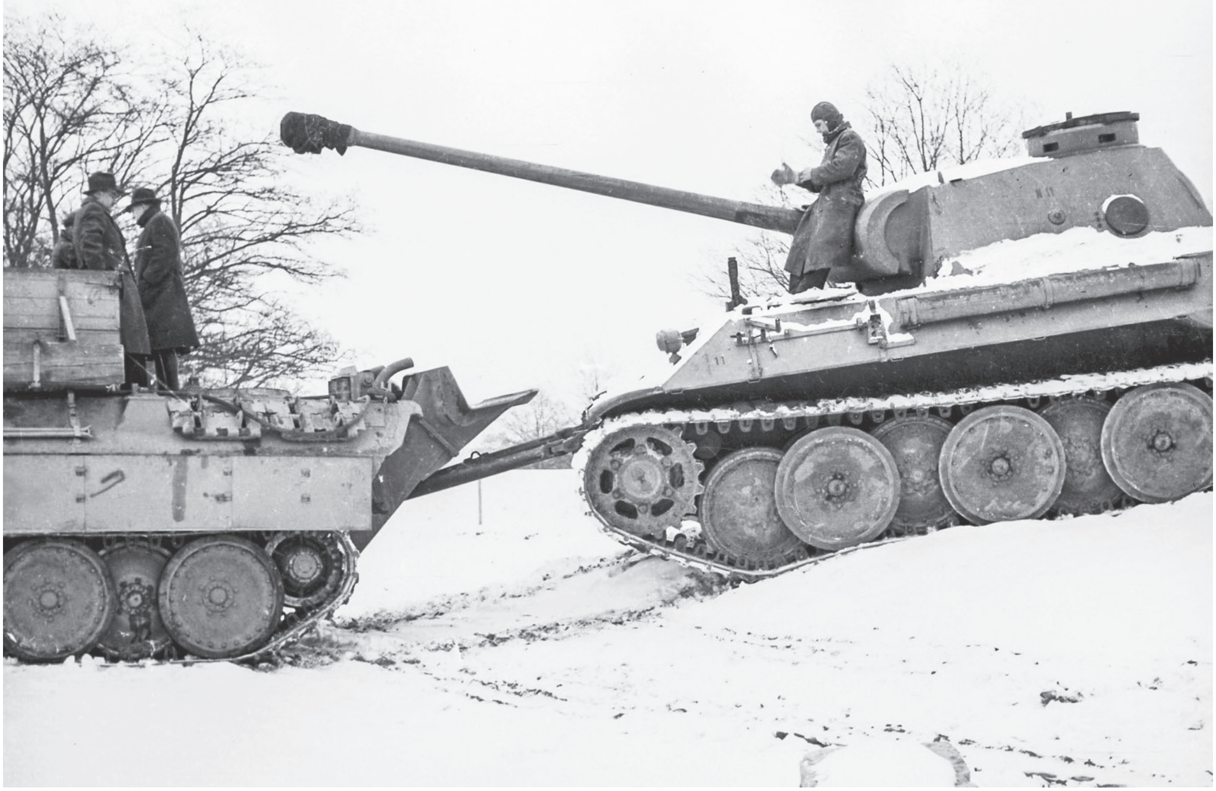
enough to pull a bogged-down tank over a short distance over difficult terrain. The effort required in the second instance is substantial and will be almost equal that of the tank to be recovered, 40t and more. In previous recovery operations this has been supplied by s ZgKw using pulley blocks and several tractor units at the same time. However, such a large assembly of vehicles quickly attracts fire from enemy artillery. It is therefore desirable to have a sufficiently powerful single vehicle. Frequently, after a battle a retreating tank is abandoned in front of our defensive lines. To recover it, an armoured recovery vehicle is a necessity, which must be powerful enough to achieve this in all conditions without the difficult (and dangerous) task of digging a pit for recovery anchors.

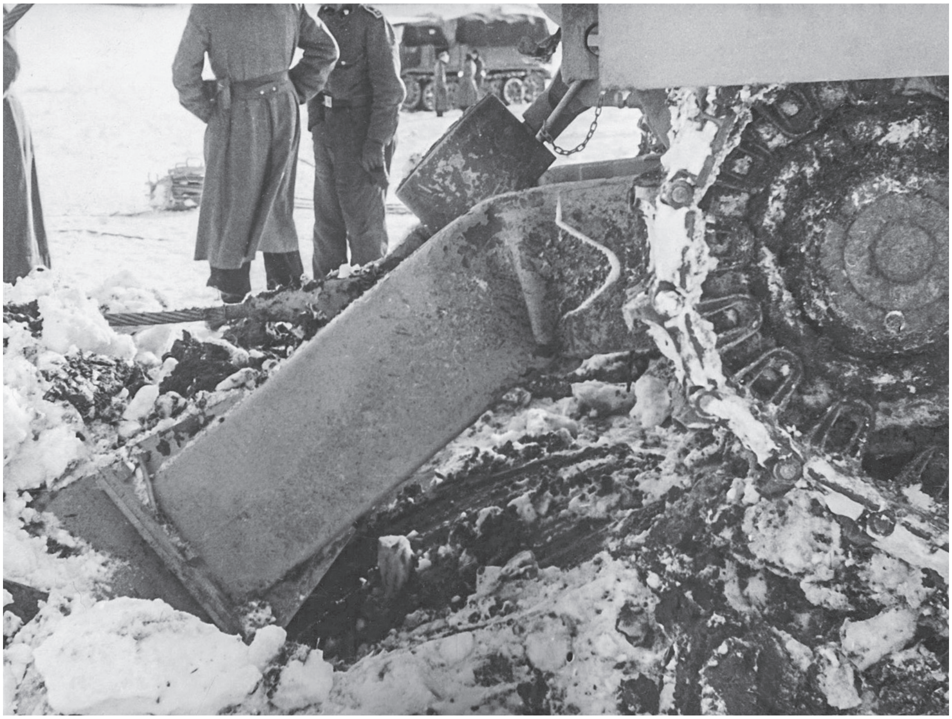


A production *Bergepanther* on a trials in winter 1943. Clearly visible are the towing bars and towing bracket. Note the position of the exhaust pipes to clear the tail spade. (NARA)

To a large extent we find that these requirements have been addressed in the newly-developed *Bergepanther* recovery tank. This vehicle has the chassis of the Panther with the same armour protection and engine performance. A heavy tail spade makes it possible to anchor the vehicle in all ground conditions and subsequently use the full power of the winch. Equipment and spare parts (total weight of 3t) can be carried on the load deck. A demountable jib crane is carried and used with a 1.5t pulley block for loading and unloading the vehicle.

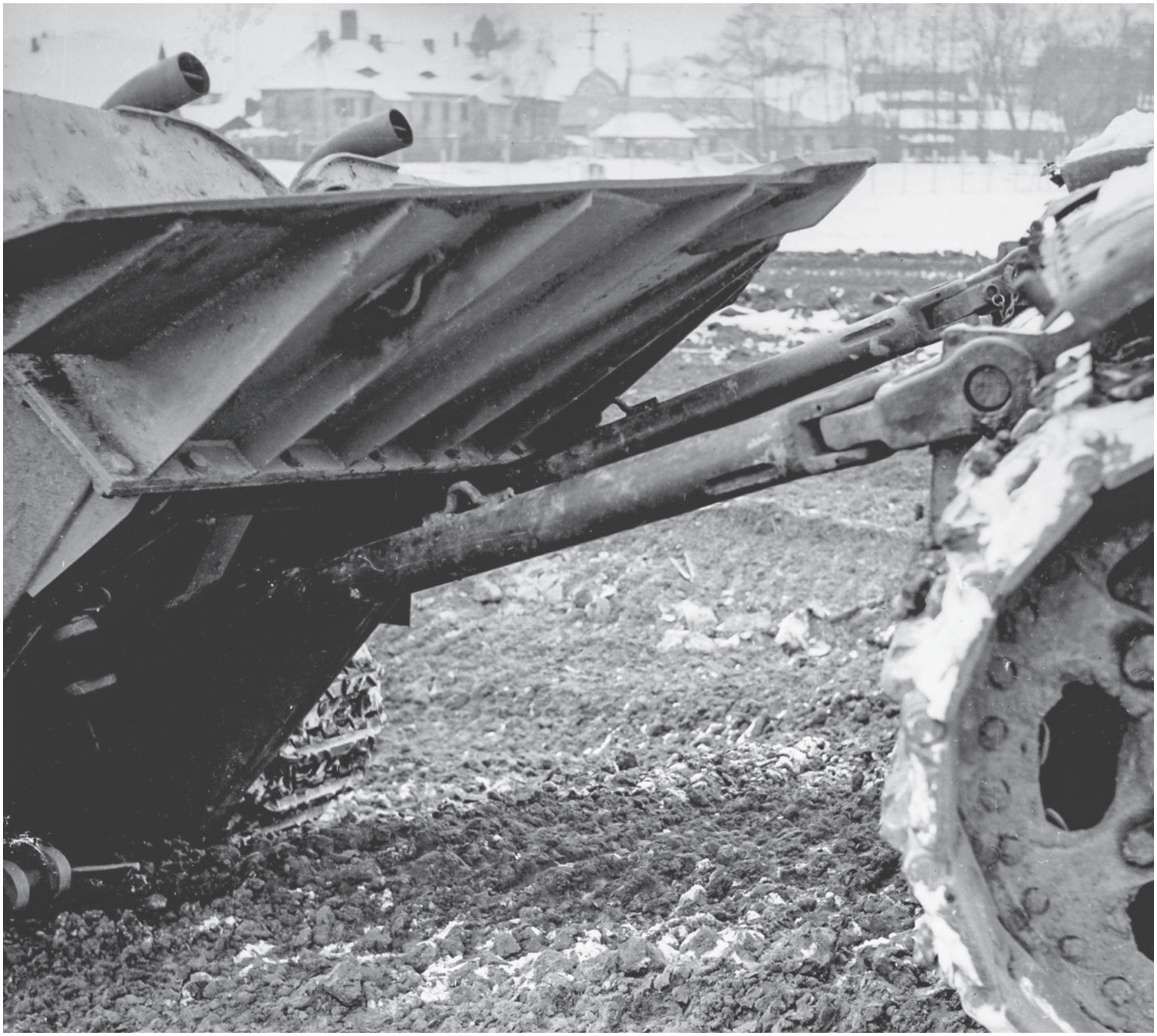
A powerful 40-ton capacity winch, with a 150m hawser, is installed in the hull and has a hawser speed of 10m/min at 1,000rpm. The *Bergepanther* is also the heaviest tank suitable for recovery operations under the most difficult





Above:
During a recovery operation, both the height of the tail spade and a tank with a long-barrelled gun could prove to be a problem. By raising the gun or rotating the turret to the six o'clock position, the possibility of damage would be eliminated. Note this PzKpfw V Panther Ausf D has an MG ring mounting fitted on the cupola. (NARA)

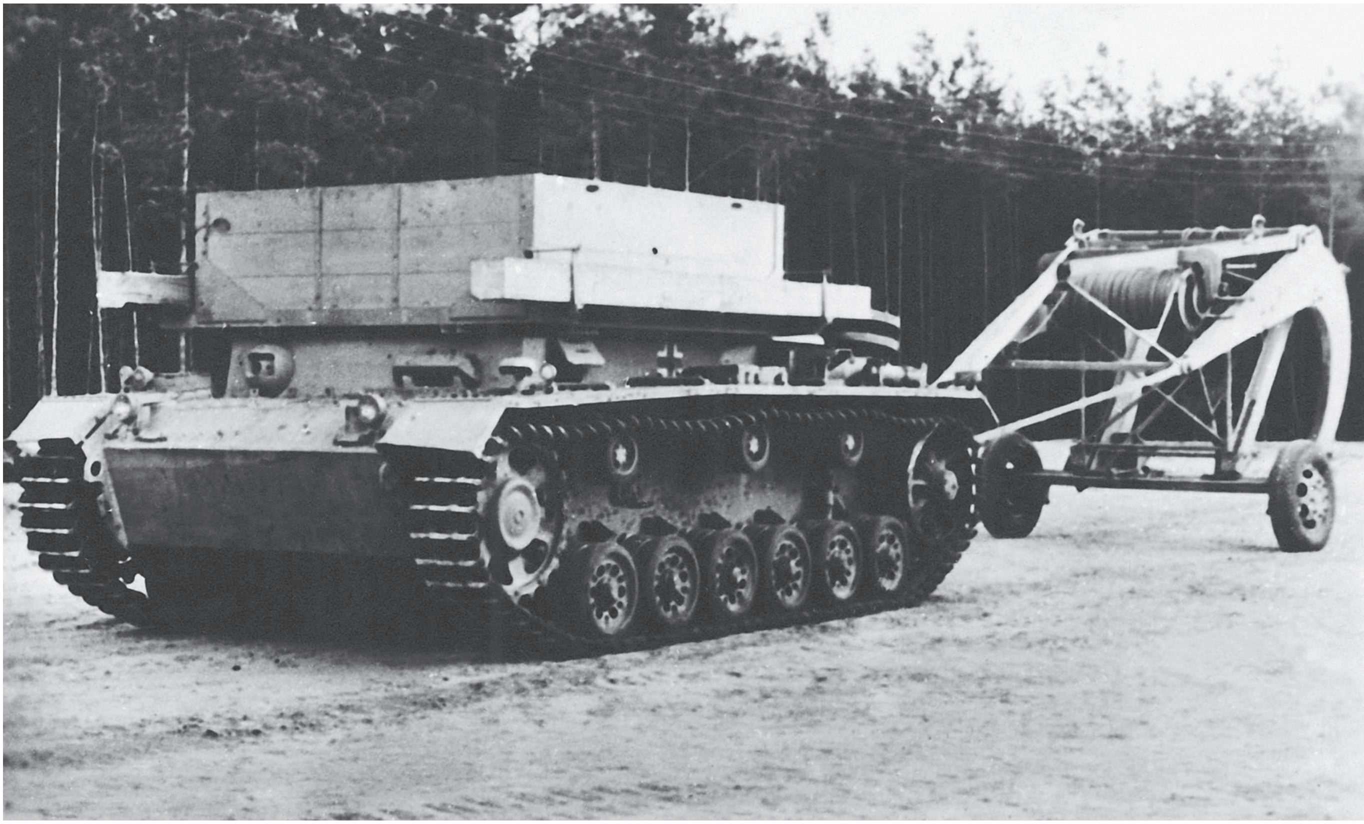
Right:
Testing was carried out in all conditions, even the harshest of winter weather. Here the spade has failed. (BA/MA)



During recovery trials towing bars were tested to their limits and in the worst case they could bend or fracture. (NARA)

> conditions; most importantly for recovering tanks from swampy areas.
> It is fitted with a trailer coupling making it available for use as a towing vehicle. In that case the tail spade is lifted clear. The vehicle has a top speed of 36kph at 2,500rpm if the vehicle has epicyclic (planetary gear) transmission, and 46kph with double-spur gear transmission.
> It is planned to fit a 2cm KwK 38 and *Maschinengewehr* (MG) 42 as defensive armament. In the *Bergepanther* our troops have a fine all-purpose recovery vehicle at their disposal.

The project for the *Bergepanther* began in March 1943 to meet an urgent requirement for a vehicle capable of recovering a Panther tank and be ready for the planned *Unternehmen Zitadelle* (Operation Citadel). Ten Panthers



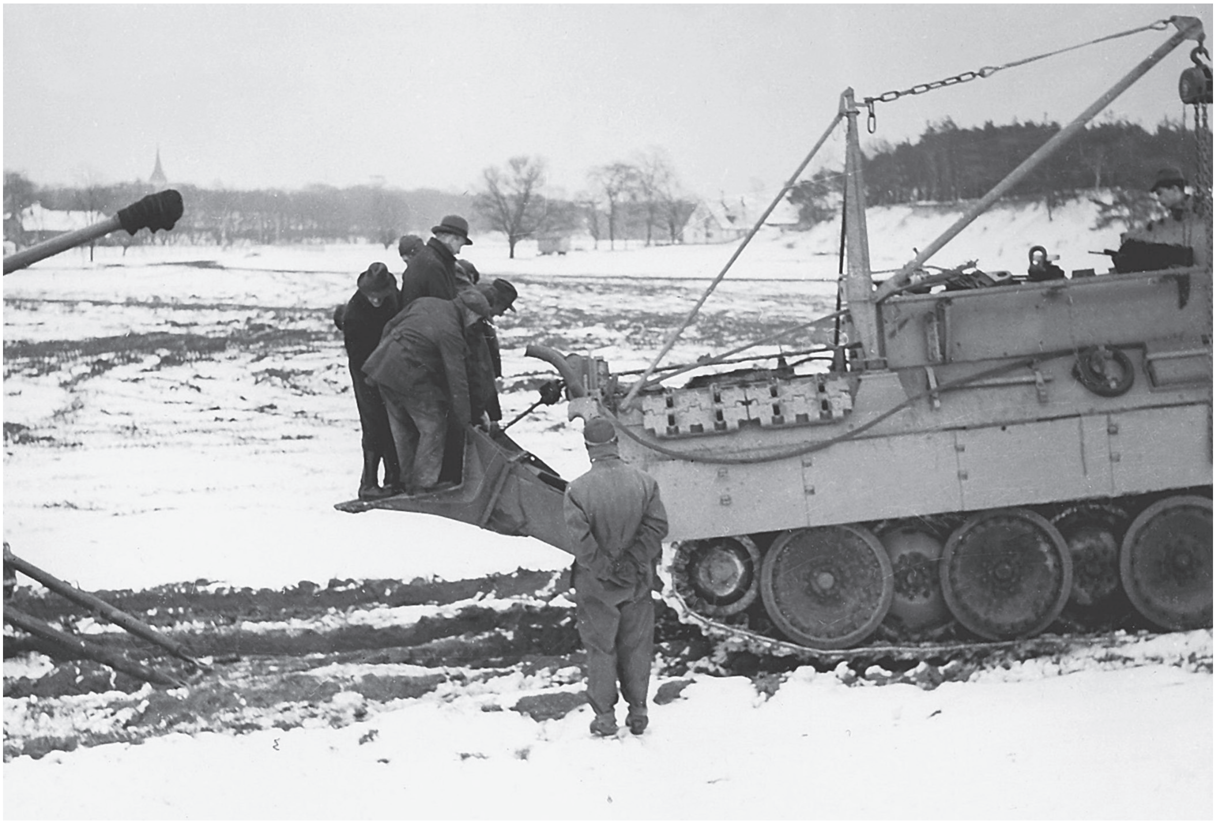
A different type of recovery anchor was developed for Panther and other recovery vehicles not equipped with a winch. Here a *Bergepanzer* III is attached to a towable anchor. (BA/MA)

were taken from the production line for convertion to recovery tanks. This was not an expensive process: the turret turntable was removed and the open space fitted with a tarpaulin cover. At first recovery equipment, such as towing bars and beams, was not available, but troops used their initiative and found whatever was required.

Later hulls were fitted with a sheet-steel cover in place of the tarpaulin, recovery beams and towing bars. In June 1943, a further twelve were delivered, but these lacked a winch and tail spade. A towable recovery anchor was developed and delivered to tank recovery units; it was also used for the later *Bergepanzer* III.

In July 1943, series production of the *Bergepanther* began (all with winch, tail spade and jib crane.) Some 233 were built using the Panther Ausf A hull, and 94 using a Panther Ausf G hull. Apparently the authorities regarded the delivery schedule as being inadequate, and decided to recruit Siebert AG, Aschaffenburg, near Frankfurt to produce the *Bergepanther*.

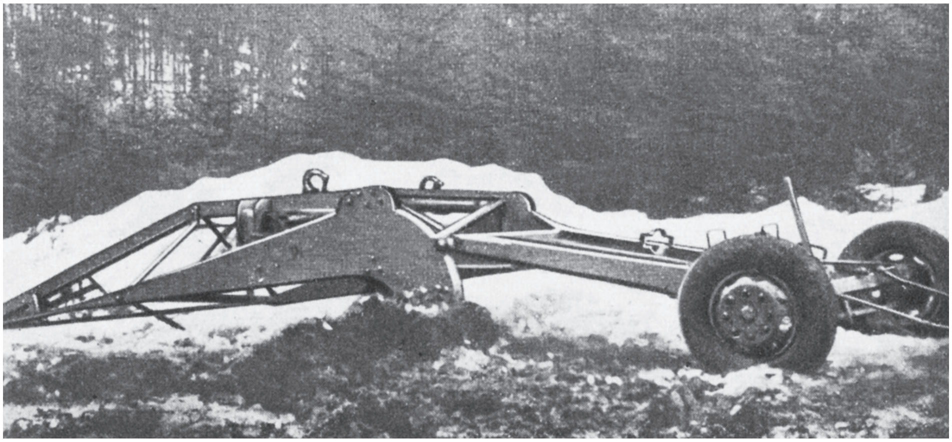
According to a US Army intelligence report, badly damaged PzKpfw V Panthers were found at the factory in April 1945. After interrogating members of staff they discovered that these had come directly from the battlefront and were to be converted to *Bergepanther* specification as part of their general repair and renovation contract.



The turrets from the battle-damaged Panthers were overhauled and upgraded, then sent to other manufacturers. According to the US report, 150 turrets were found; a possible indication of the number of recovery tanks produced by Siebert AG. However this cannot be verified.

The *Bergepanther* was undoubtedly the most efficient recovery vehicle of World War II.

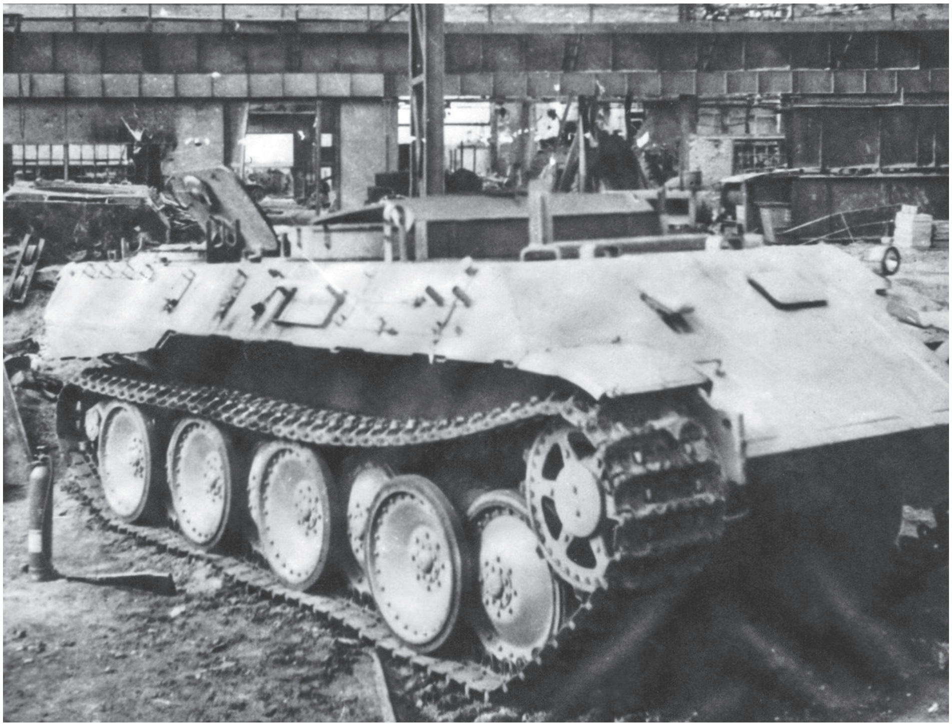
Above:
A wire rope attached to the winch and run through a pulley block were used to lower and raise the very heavy spade. (NARA)

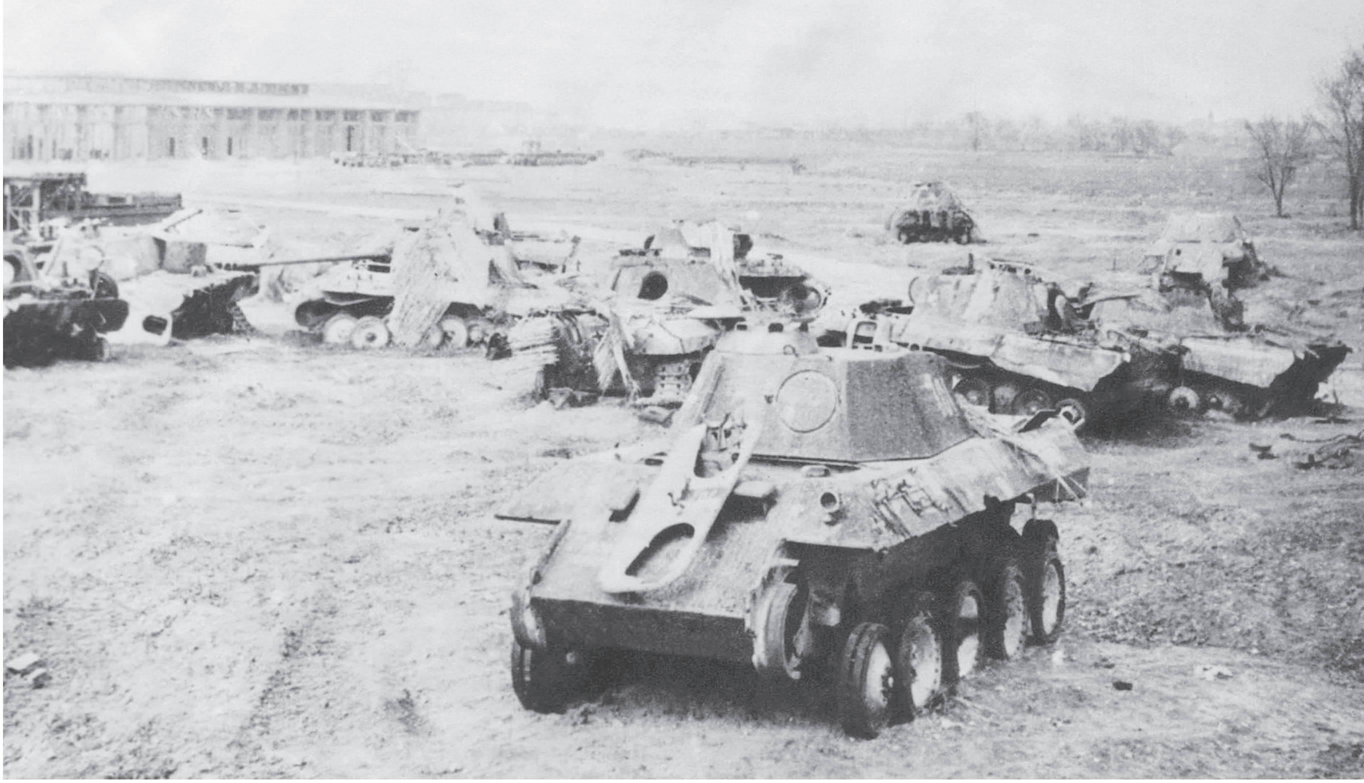


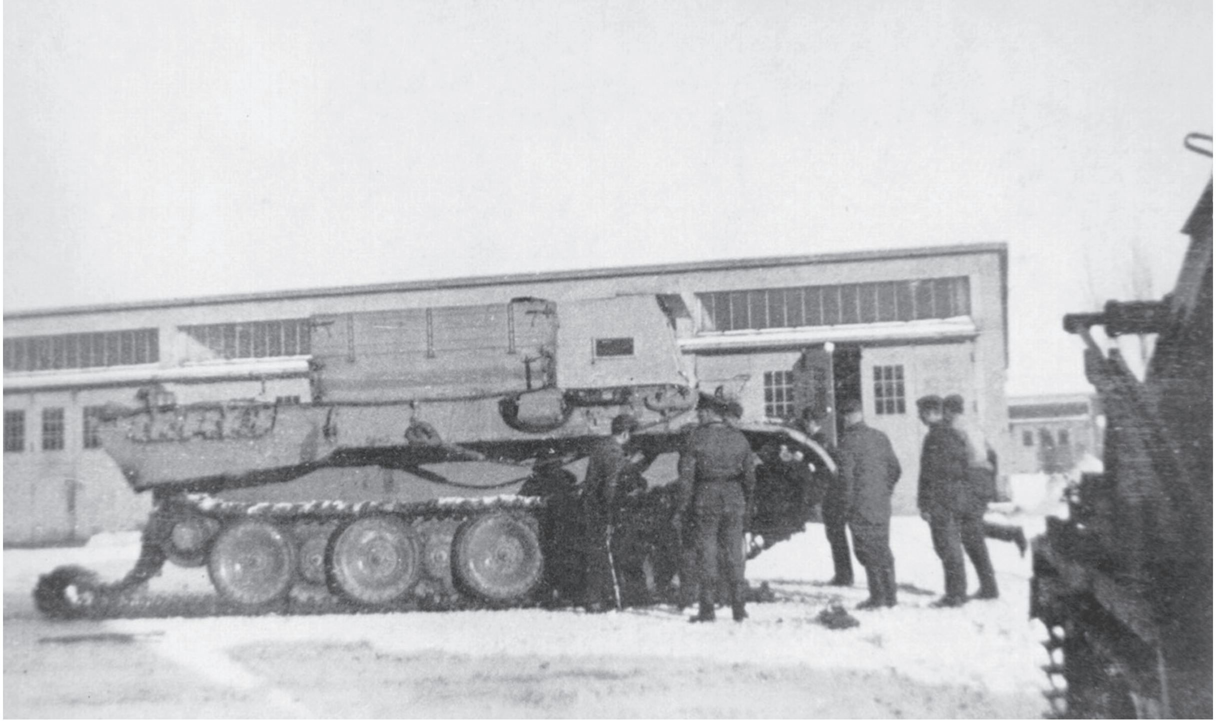
Left:
A towable recovery anchor in use. The chassis was lowered and the anchor positioned. Using steel rope and a number of guide pulleys, a main pulley block would now be positioned between the towing hull and the immobile tank. (NARA)

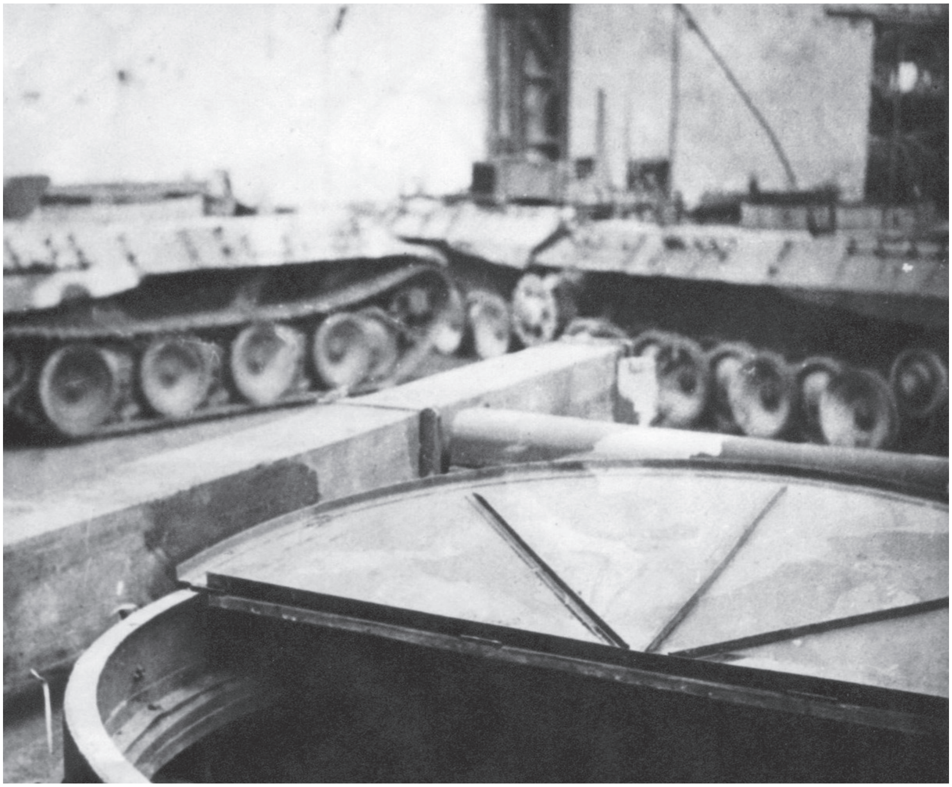
Right:
This recovery hull is distinctly different from the first vehicles built in 1943. A mounting for a FlaK gun has been welded to the periscope cover. Modified fixtures for the towing gear have been added. (NARA)

Below:
Damaged Panthers which could not be repaired by front-line units or closer repair facilities were transported back to Germany to be cannibalized for usuable parts then scrapped by Siebert AG. (NARA)



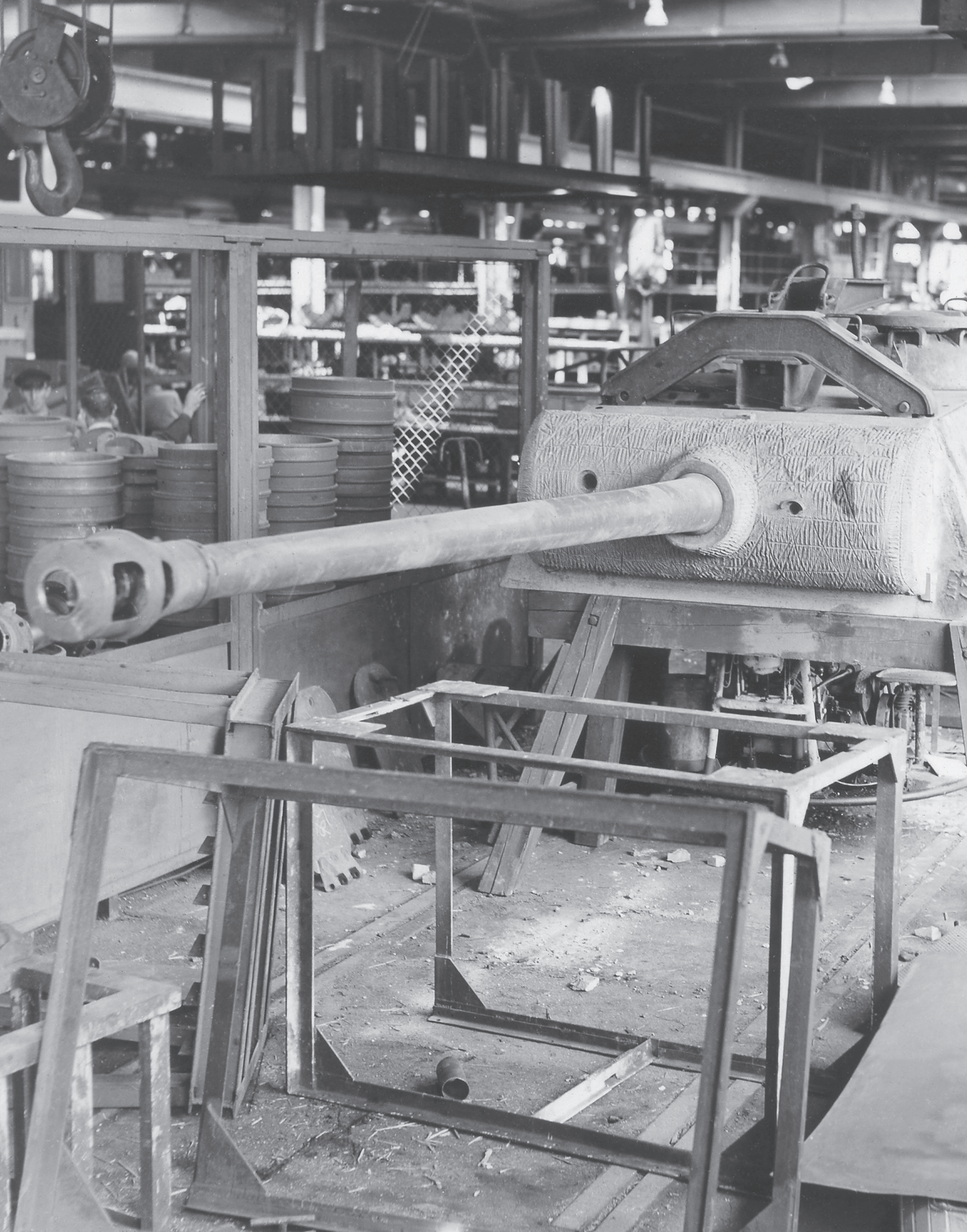






Above:
Interestingly this production *Bergepanther* is not fitted with a tail spade (and possibly no winch), but does have a simple structure to cover the driver/wireless operator compartment against the weather. It is probably in service with a reserve unit as a driver-training vehicle. (NARA)

Left:
Siebert AG of Aschaffenburg was awarded a contract for the general repair and reconditioning of Panther hulls and to return them to service as *Bergepanther*. Four are visible in this photograph taken in 1945. (NARA).



Production

4

The Panther was manufactured by four companies: MAN at Nuremberg, Daimler-Benz at Berlin-Marienfelde, Henschel at Kassel and MNH at Hanover. By the end of World War II, some 6,000 had been produced.

Series Production

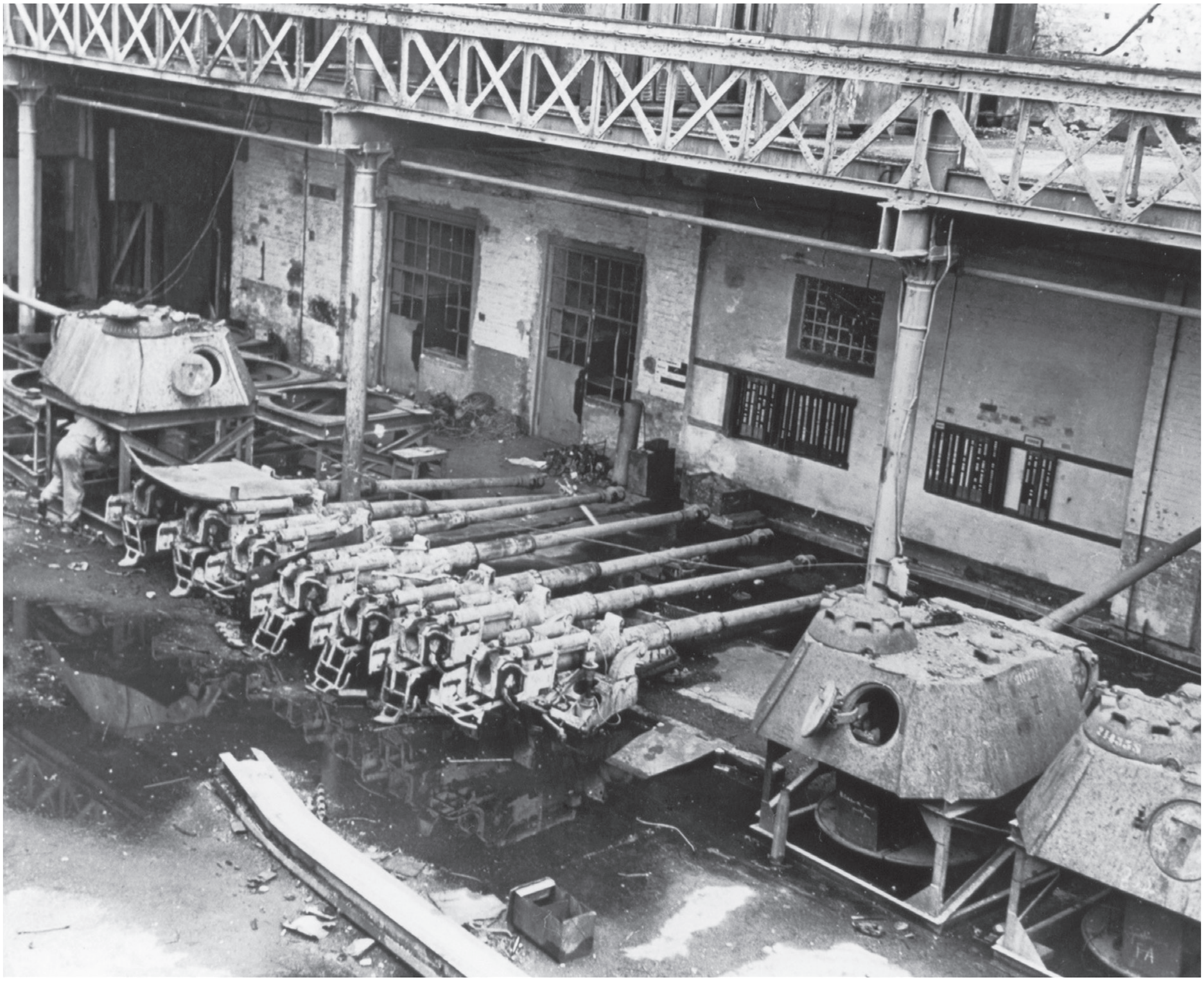
When the decision was taken to go ahead with the VK.3002 (MAN), series production began at the MAN factory in November 1942. To increase deliveries, Daimler-Benz, Maschinenfabrik-Niedersachsen-Hanover (MNH) and Henschel became involved.

During and after the failed offensive at Kursk, production of the PzKpfw V Panther continued. Known faults could only be corrected at the factory, although over time most problems were eliminated. By 1944, the Panther had developed from the fault-ridden tank of the *Panzerwaffe* to a formidable battle tank much appreciated by crews.

The first production tanks were designated as Ausf D although in a number of production sketches they were (logically) designated Ausf A. The reason for this contradiction remains unknown. During production of the Ausf D, all the alterations made at DEMAG at the beginning of the run were now included. By September 1943, some 850 Ausf D versions had been completed.

When production of the Ausf A began in August 1943 the only recognizable change was the shape of the turret which had been simplified for ease of manufacture. Other changes included a lower more ballistically resistant cast-steel turret cupola and a ball-type mounting for the bow MG 34. As production began to ramp up the numbers Ausf As delivered showed a noticeable improvement; even DEMAG delivered some fifty Panthers. By July 1944, approximately 2,200 PzKpfw V Panther Ausf As had been completed.

The newly fabricated Panther turret on an assembly stand. Between August 1943 and September 1944, Zimmerit anti-magnetic paste was applied to each tank on completion at the factory. (NARA)



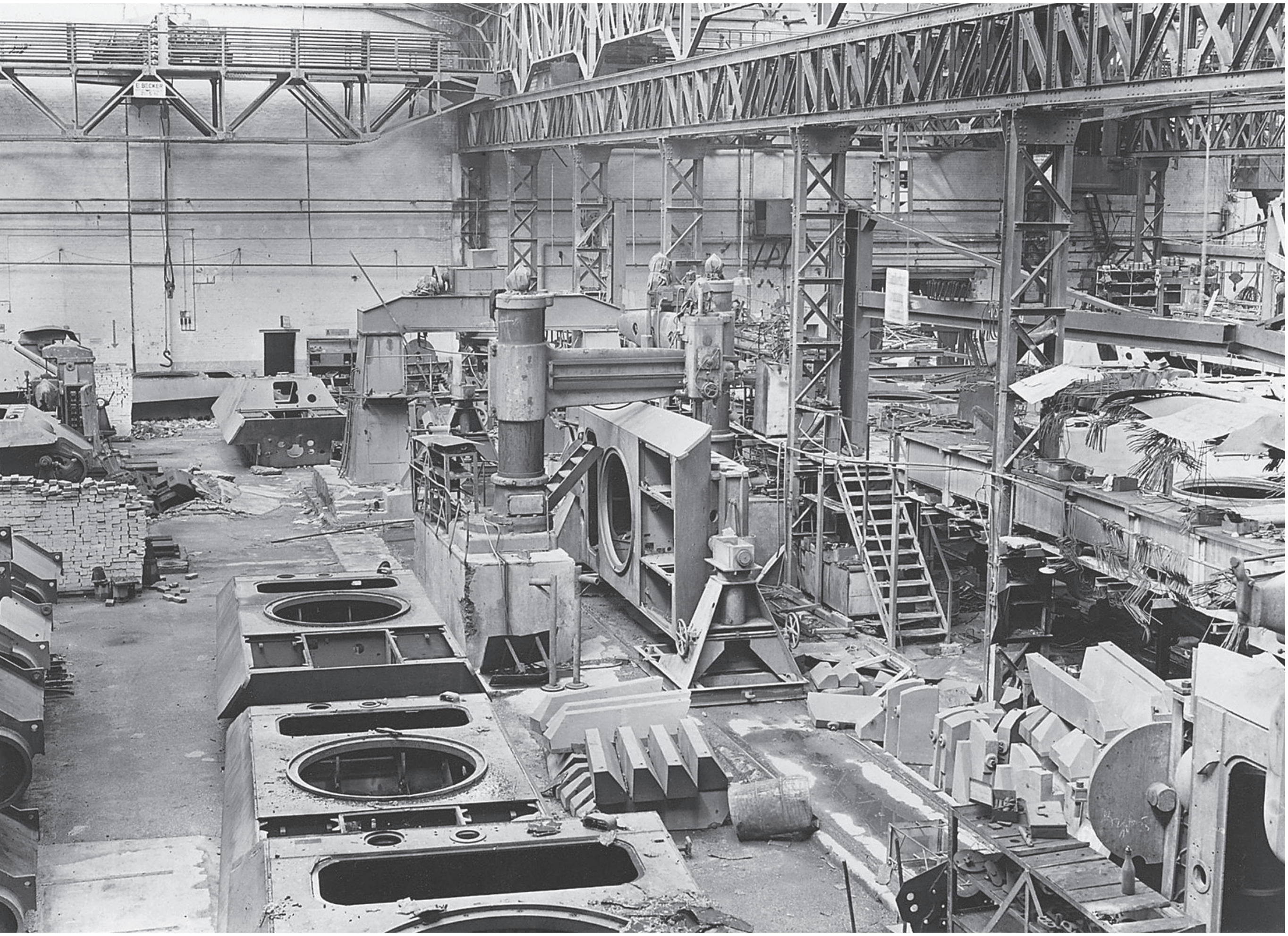
The turret assembly shop at the MNH works, Hanover. The turrets are for Ausf G and the guns are 7.5cm KwK 42 L/70 fitted with the double-baffle muzzle brake. (Panzerfoto)

Production was switched to the much improved Ausf G in March/April 1944. The hull was only slightly altered, the shape of the sides resembled those of a Panther II and the turret was fundamentally unchanged. During production of the Ausf G, the number of rubber-tyred running wheels was reduced in order to economize on rubber.

A total of some 340 *Bergepanthers* were produced, the largest number being built by DEMAG. An unknown number of PzKpfw V Panthers and *Bergepanthers* were repaired or reconditioned in the Reich, and then immediately returned to service.

Further Development

In 1942, before the production of the PzKpfw V Panther began, demands were heard that the new tank should be replaced by an improved model in the near future. It was thought that the current model should guarantee



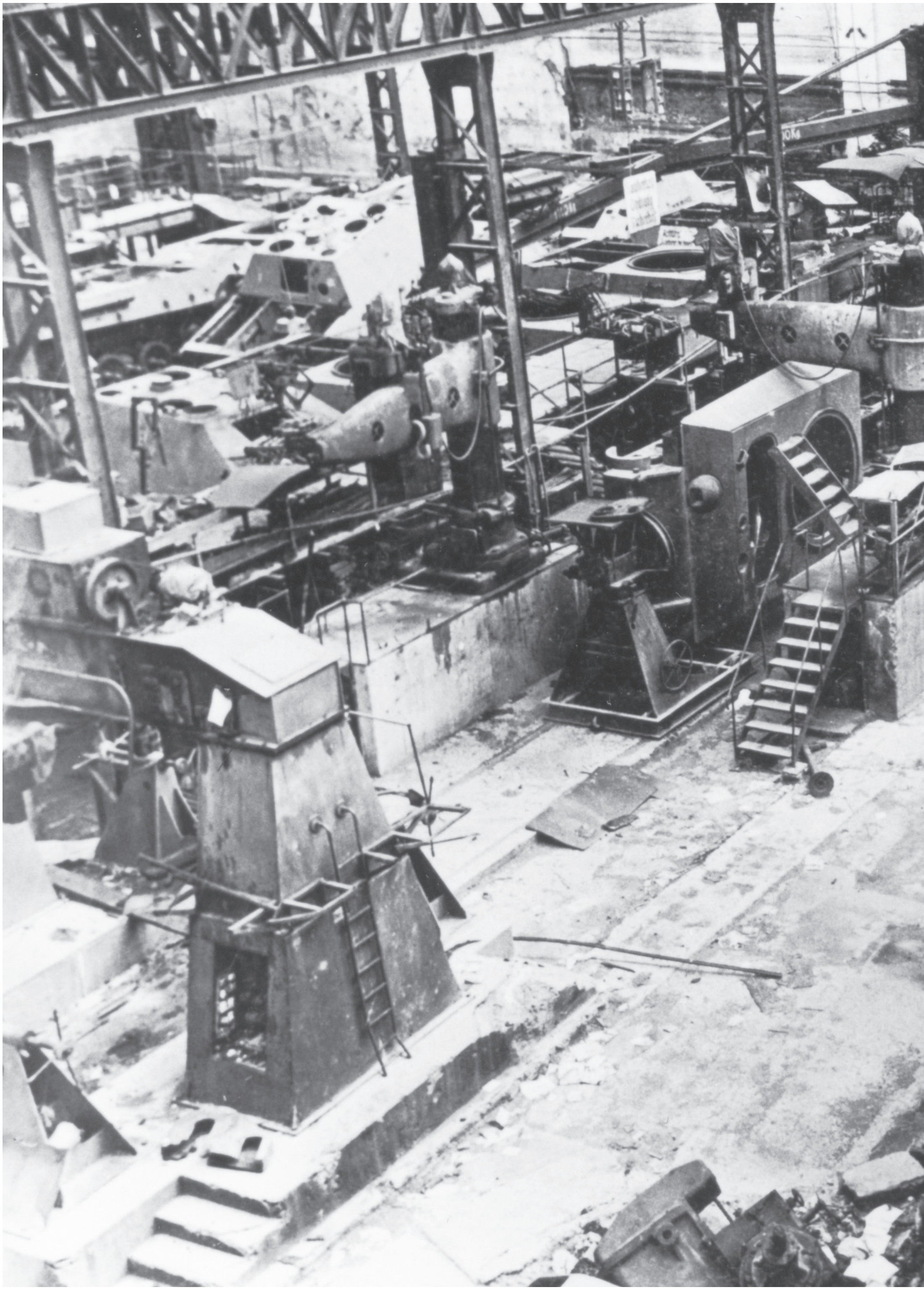
Hulls for the Ausf G lined up at an early stage of production. Fuel tanks ready for fitting are stacked on the floor of the factory. (NARA)

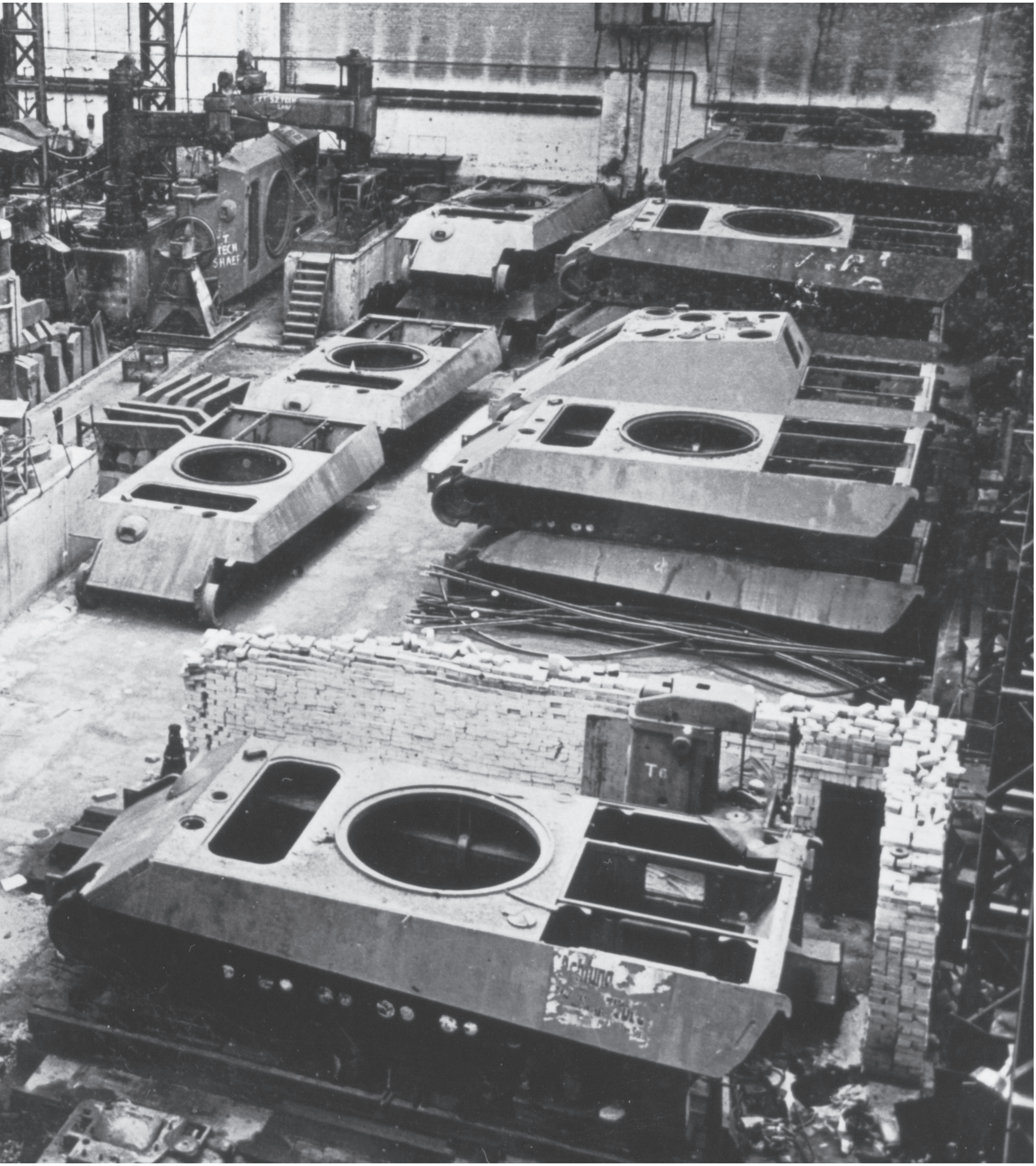
battlefield superiority throughout 1943, but to anticipate improvements in enemy tanks for 1944, an improved tank, the Panther II, had to be developed.

An armaments conference noted:

> From the Führer conference, 3 to 5 January 1943:
>
> 4.) Based on various suggestions the Führer has decided that the Panther is to undergo modification by fitting 100mm frontal armour and 60mm at the sides. On account of the extraordinary technical difficulties in developing a better armoured Panther, those Panthers which have been completed are to be made, with some provision, operational.
>
> 6.) It is to be investigated to what extent a longer calibre length barrel can be fitted to the 7.5cm gun (if possible L/100 or more) and what results can be expected. The higher performance should be sought in the trials by using all means necessary without regard to barrel life. In that respect there are more powerful shell-case fillings to be tried.

The Ausf G assembly shop at the MNH factory, Hannover. The machine in the top centre is a jig welder for joining the lower hull to the superstructure. Note the *Jagdpanther* hulls. (Panzerfoto)

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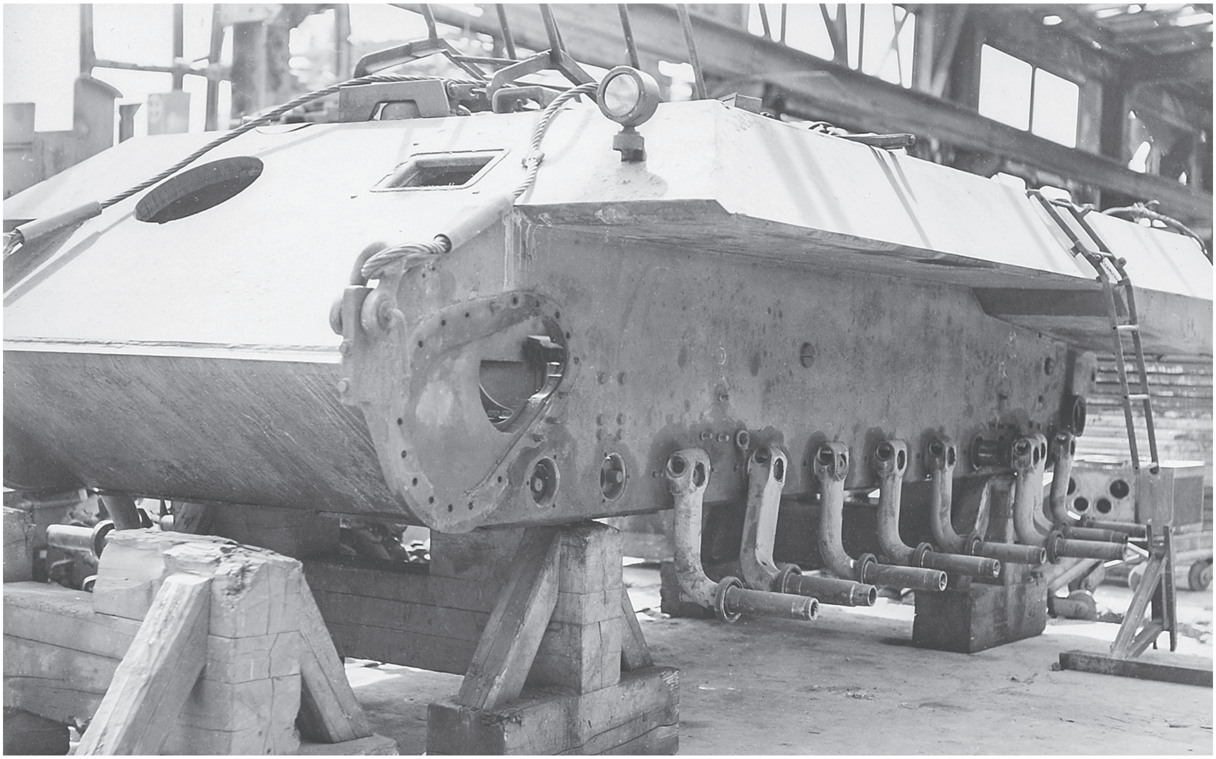
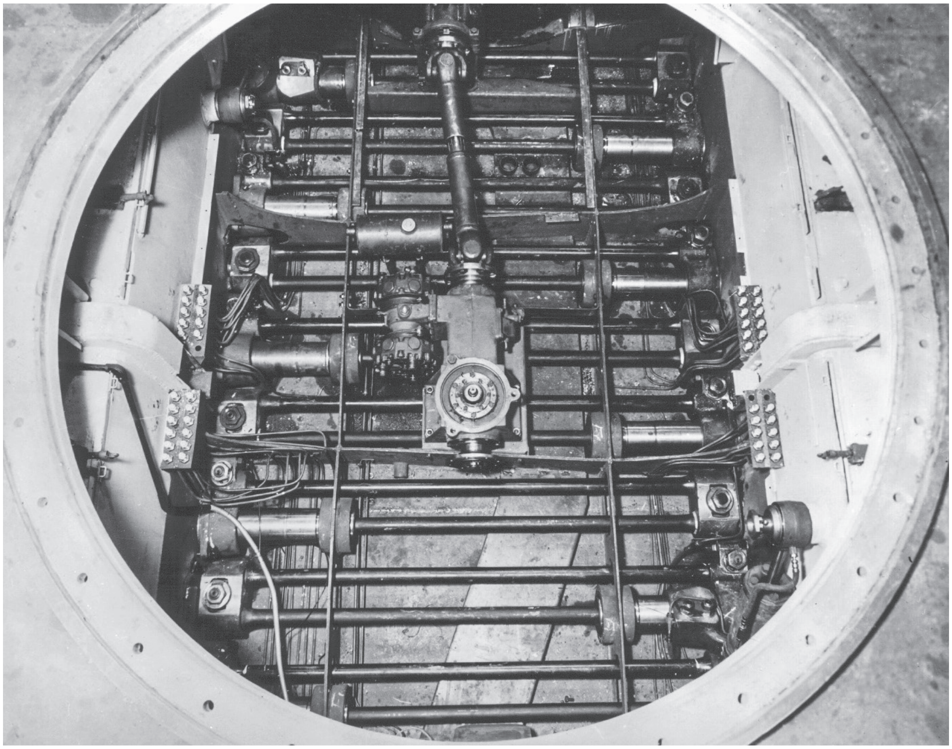
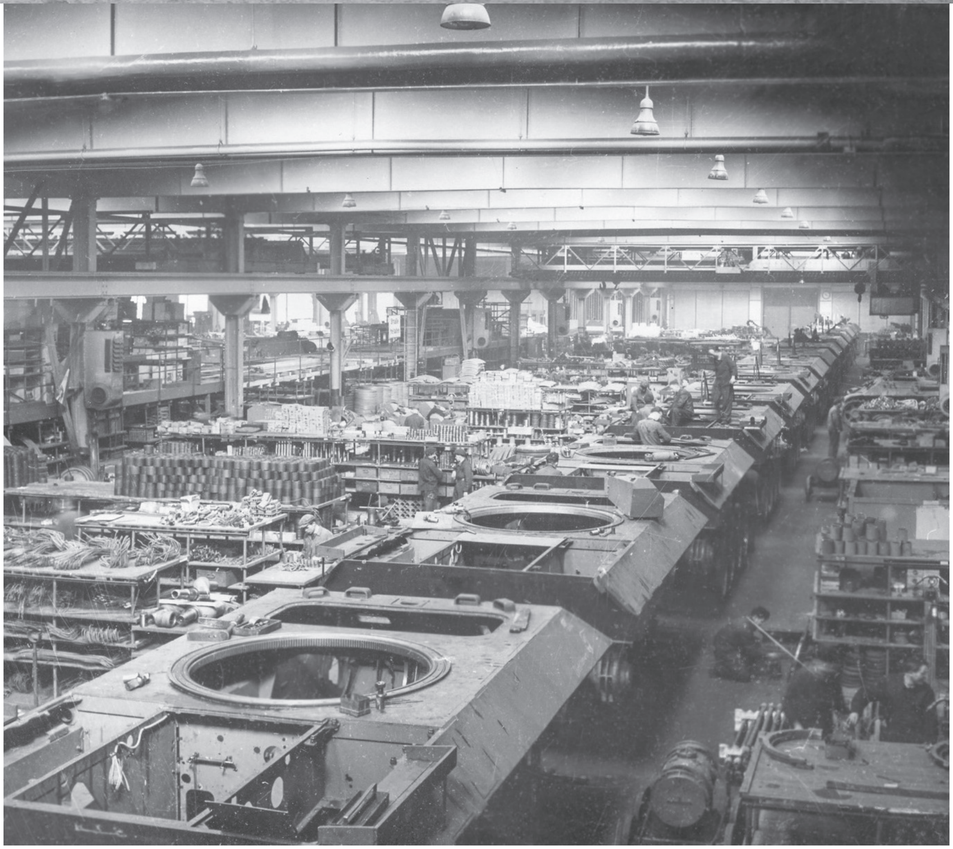




Above:
The hull of an Ausf A. During production the armoured hatch for the front MG was replaced with more protective housing and ball-type mounting: note the circular aperture in the glacis plate. (NARA)

Right:
The dual torsion bar system suspension was joined by a yoke to each pair of running wheels. The motor for the turret turntable, with the shaft linking it to the engine, is positioned in the centre. (NARA)

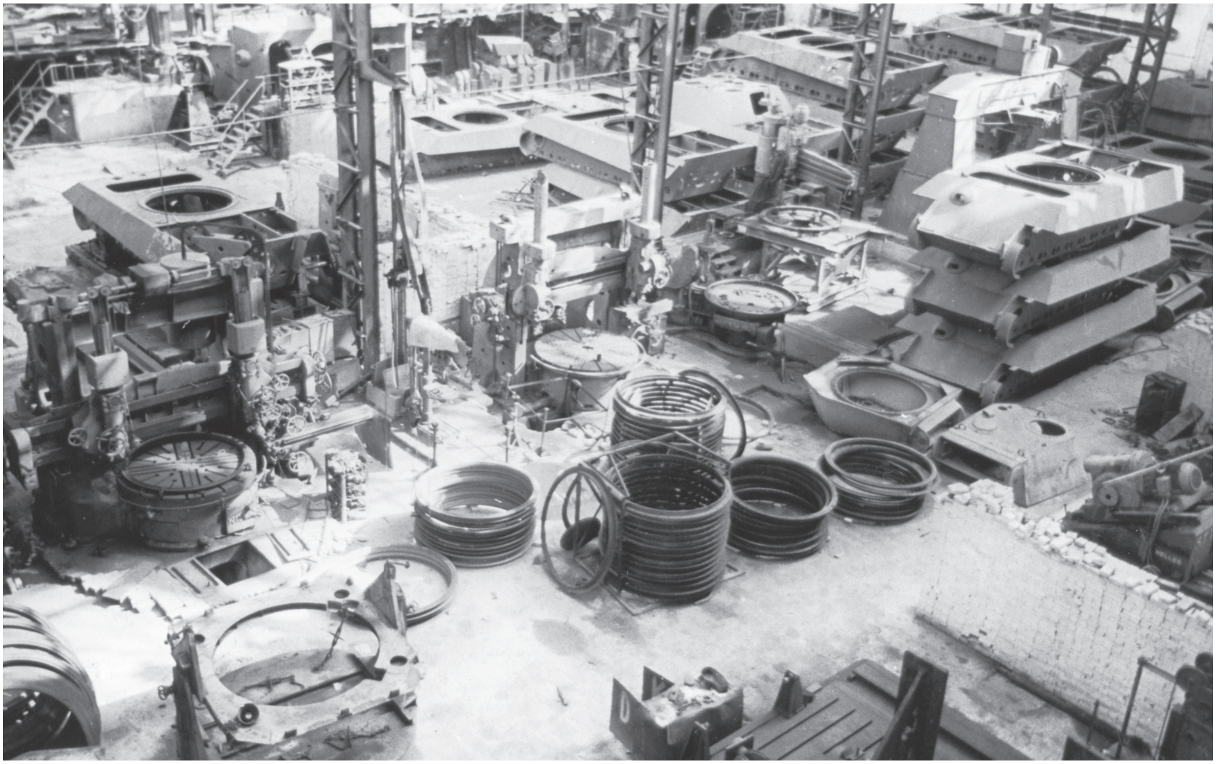


Bare hulls for the PzKpfw V Panther Ausf D on the production line. All the smaller items to complete the fit-out are stored on racks (at left). (NARA)

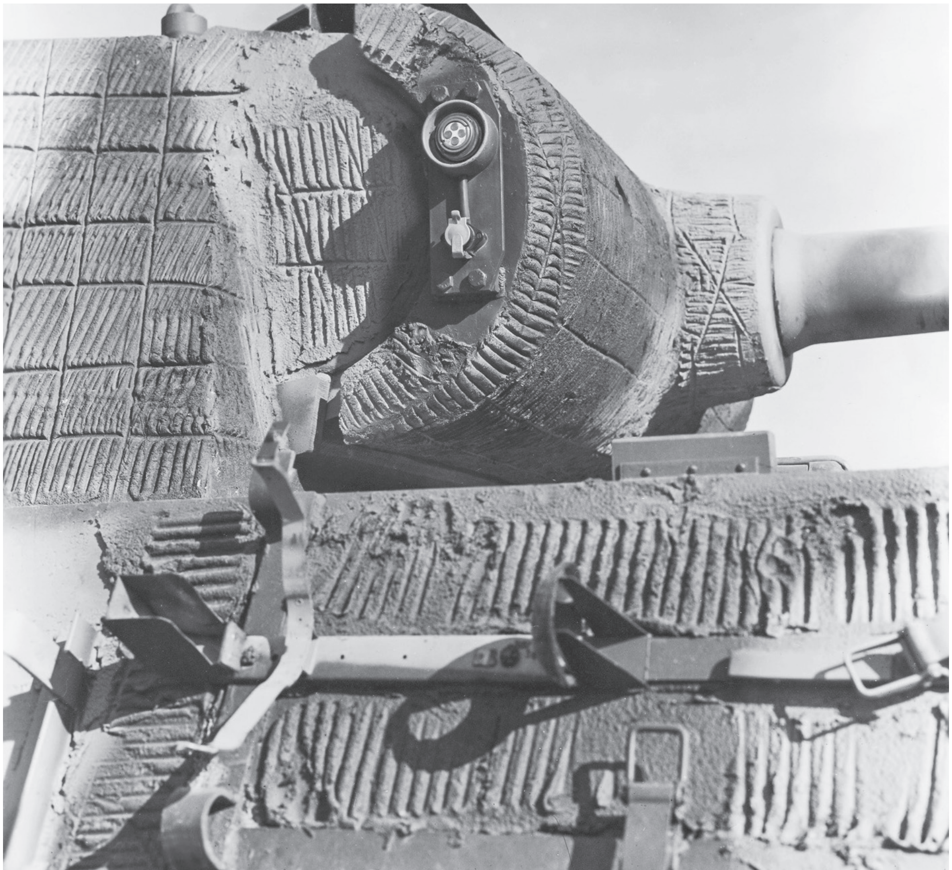
After the first actions involving the Panther, tank crews were encouraged to make suggestions for any improvements. The side armour of the hull was especially criticized as it did not protect against Soviet 7.62mm shells. However, a major upgrade of the armour on the current production series had not been possible, and the addition of supplementary armour had proved to be impracticable.

The first concept drawings of the Panther II were remarkably similar to current series production vehicles, the important difference being the increase in armour. The frontal armour was to be increased from 80mm to 100mm, and the side armour from 40mm to 60mm. The hull roof could be reinforced to 30mm and the plating simplified. In the event the hull was redesigned and a prototype built. Apparently a number of parts were to be compatible with the later Tiger II. The running wheels on the Panther II were not rubber tyred to economize on this valuable commodity, but the drive sprocket, leading wheel and tracks (as transport tracks) would all be used for the Tiger II.

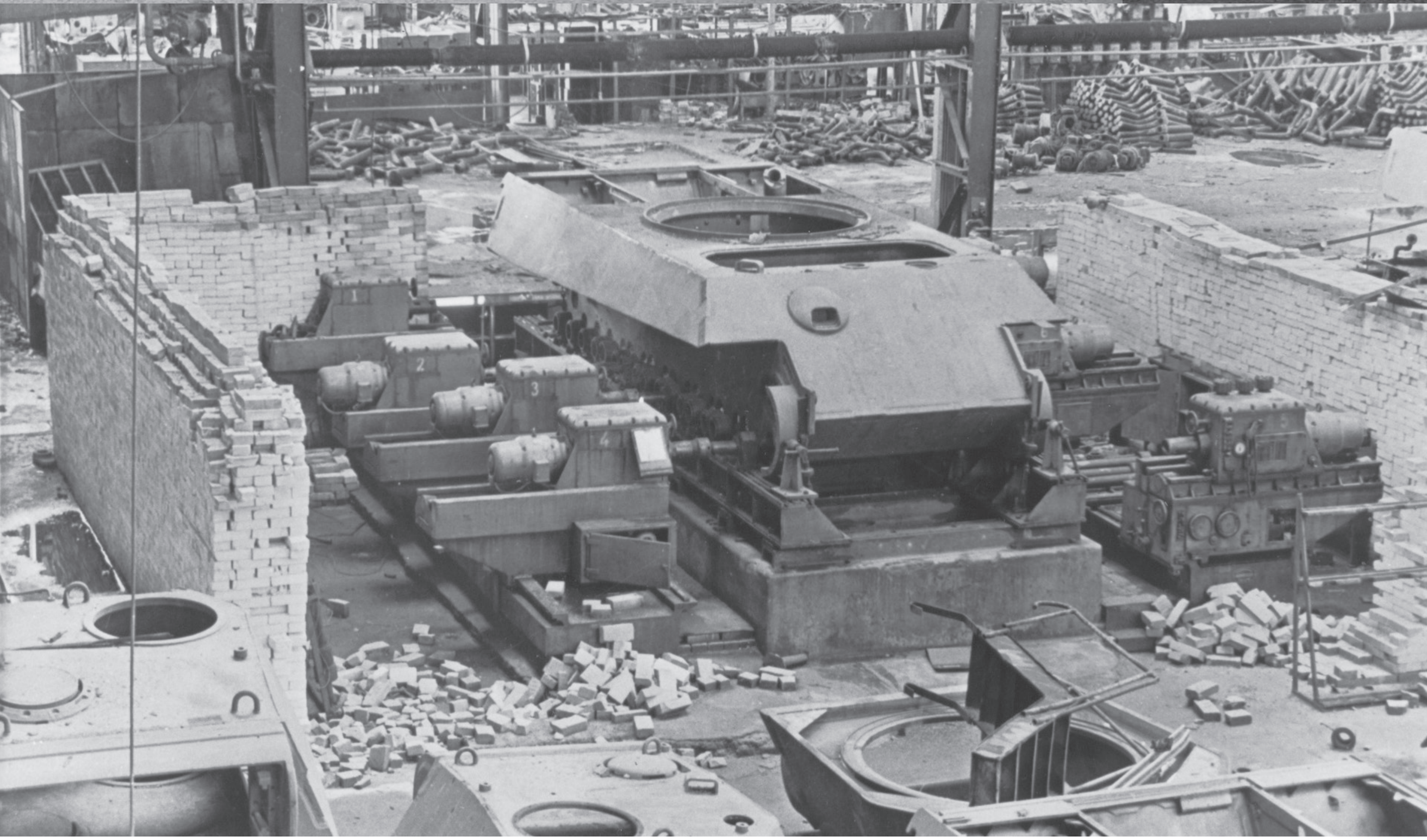
In May 1943, for reasons unknown, it was decided to abandon the development of the Panther II; presumably due to the economic situation in Germany. The turret design was scrapped, but the quest for thicker armour was to be continued. Interestingly, on the Panther II the turret front was to be 120mm thick (the mantlet 150mm); excellent protection. The side of the turret and hull sides were to be 60mm thick and the turret roof 30mm. Also there was an inexplicable change to the main armament: the 8.8cm KwK 43 L/71 was to be available as an alternative to the 7.5cm KwK 42 L/70.

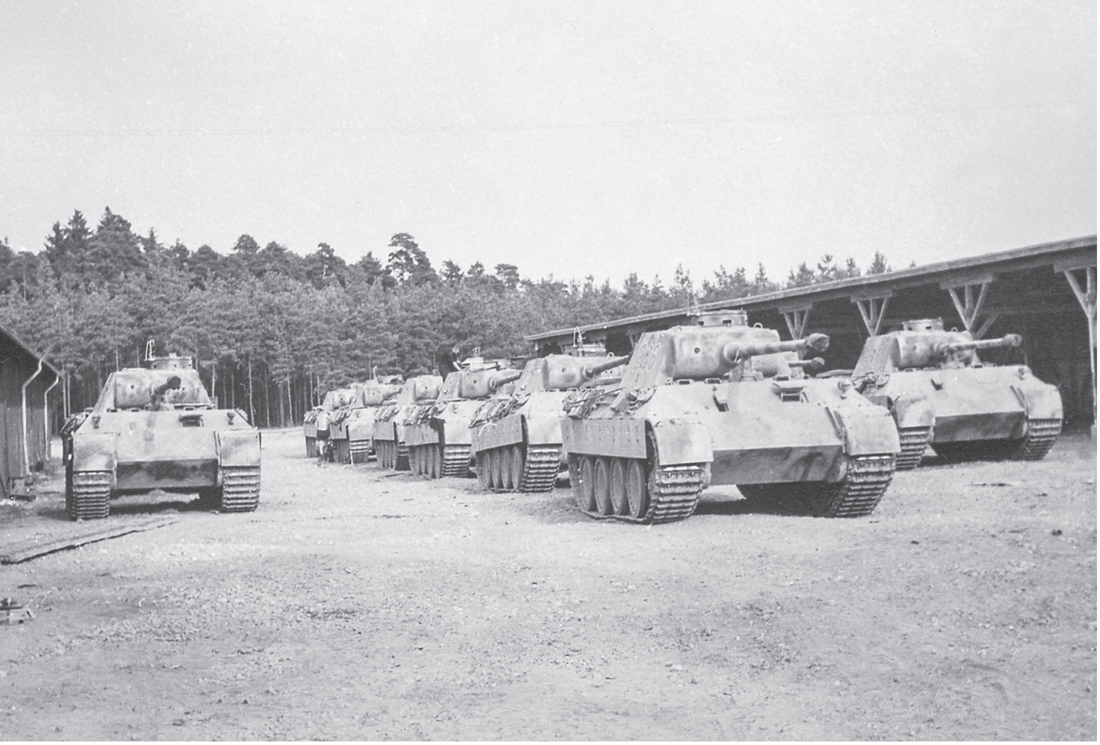


Above:
Turret traversing ball-race rings awaiting machining and fitting to turrets. Note (at the bottom left) the large jig boring machine with a turret ring in place on the turntable. (Panzerfoto)



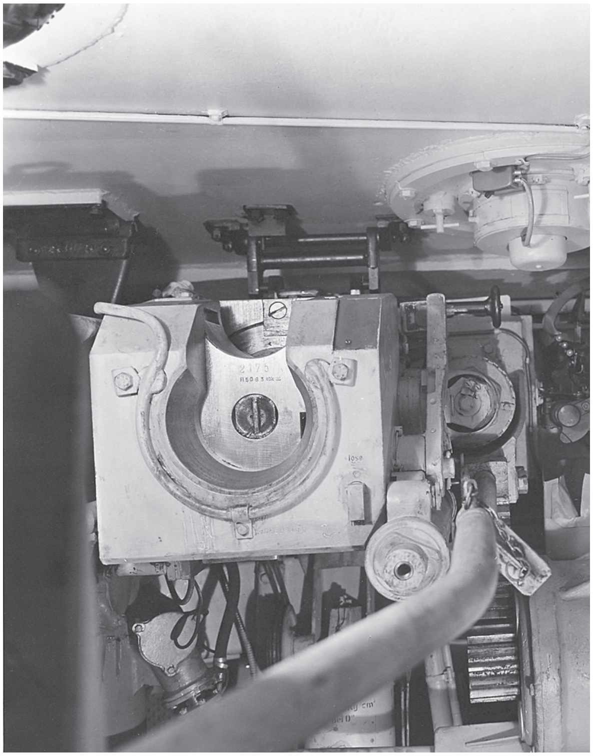
Right:
Mountings and electrical connectors for the infra-red searchlight were mounted on the side of the gun mantlet. (Historyfacts)

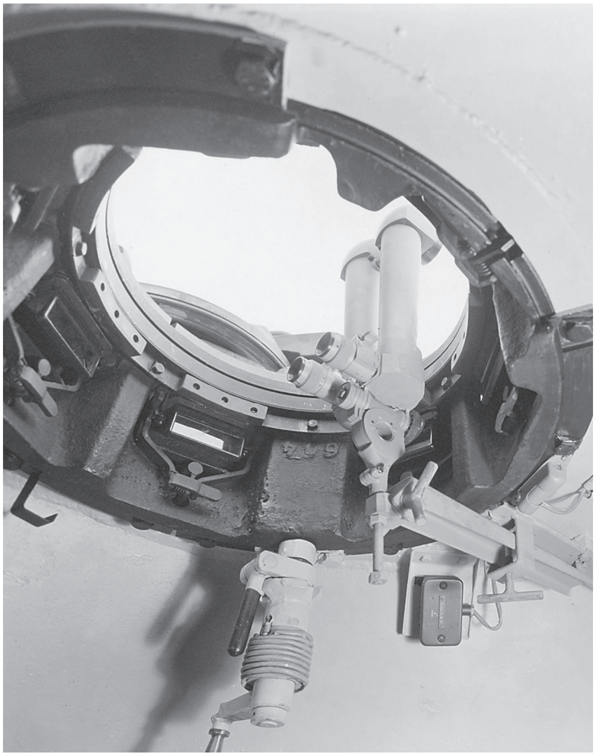




Above:
A specialist machine for locating and fitting the bearings for the torsion bar suspension. The hull is held on the jig while the machine heads move along the vehicle. (Panzerfoto)

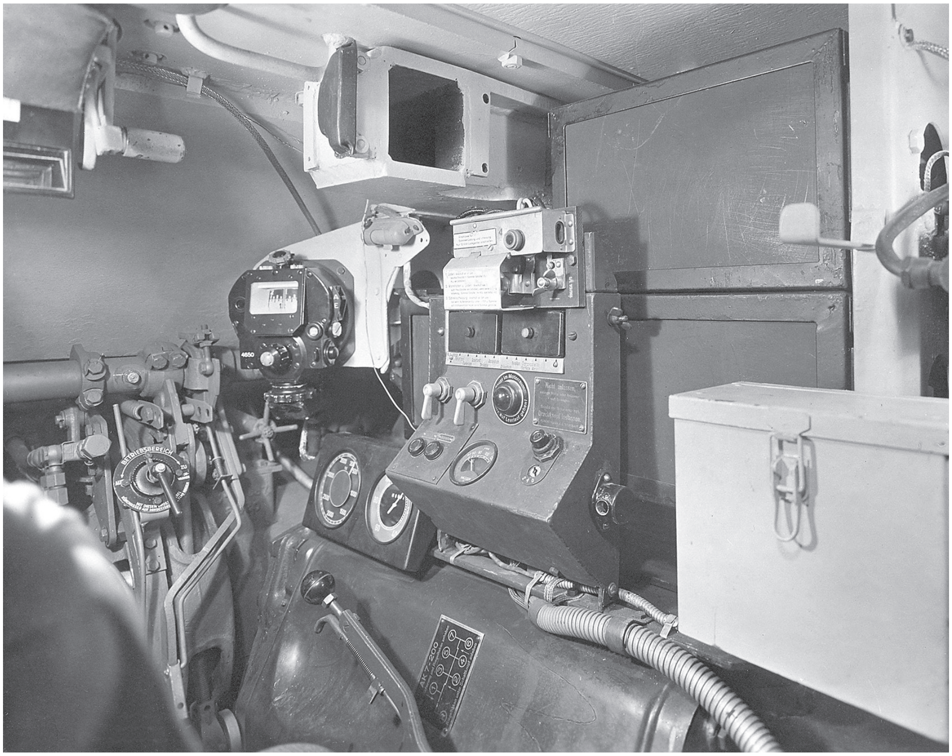
Left:
A company of Panther Ausf D tanks awaiting delivery. All are fitted with an MG ring mounting on the cupola which indicates that they are not early production tanks. (NARA)



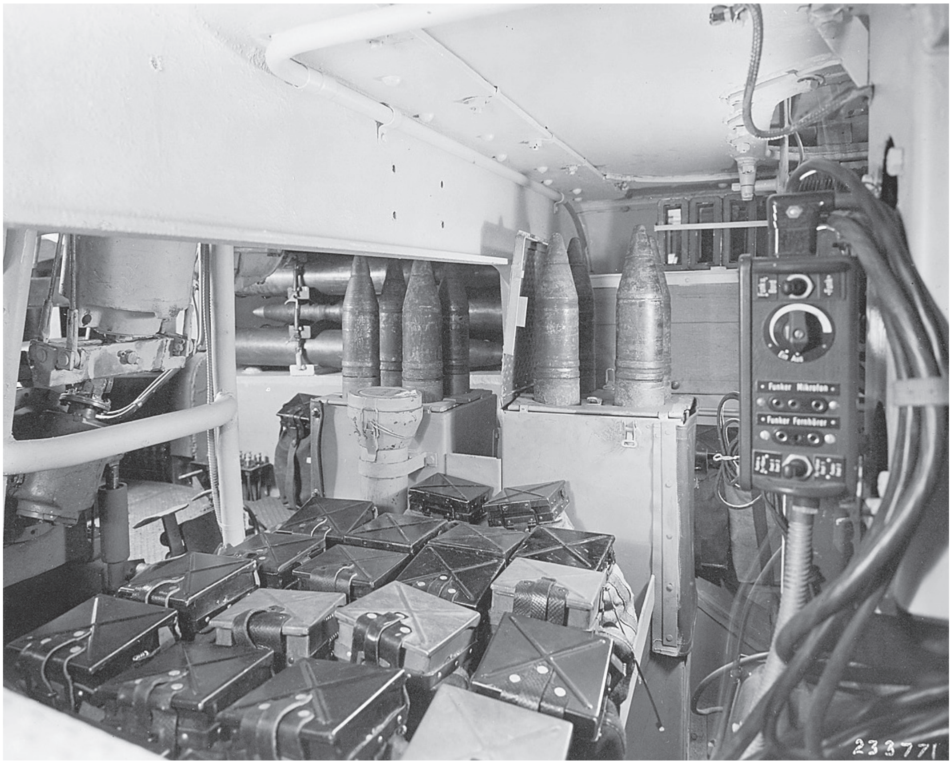


Above left:
The breech of the 7.5cm KwK 42 in the turret of a Panther Ausf G. The periscope for the gunloader is mounted in the turret roof; just in front is the turret ventilator. (NARA)

Above right:
The cupola surrounded by vision blocks from the commander's seat. A *Scherenfernrohr* (scissors-type telescope) has been mounted for battlefield observation. (NARA)



Right:
A speedometer and an engine revolutions counter were positioned above the gearbox to the right of the driver. Next to these is the control box for the on-board intercom system. (NARA)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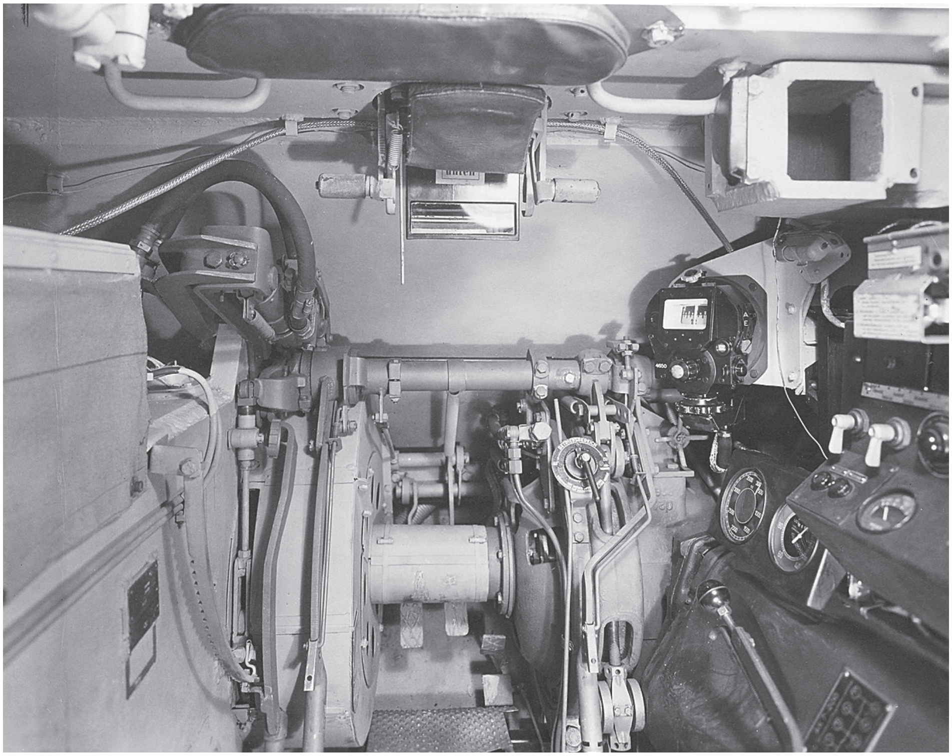
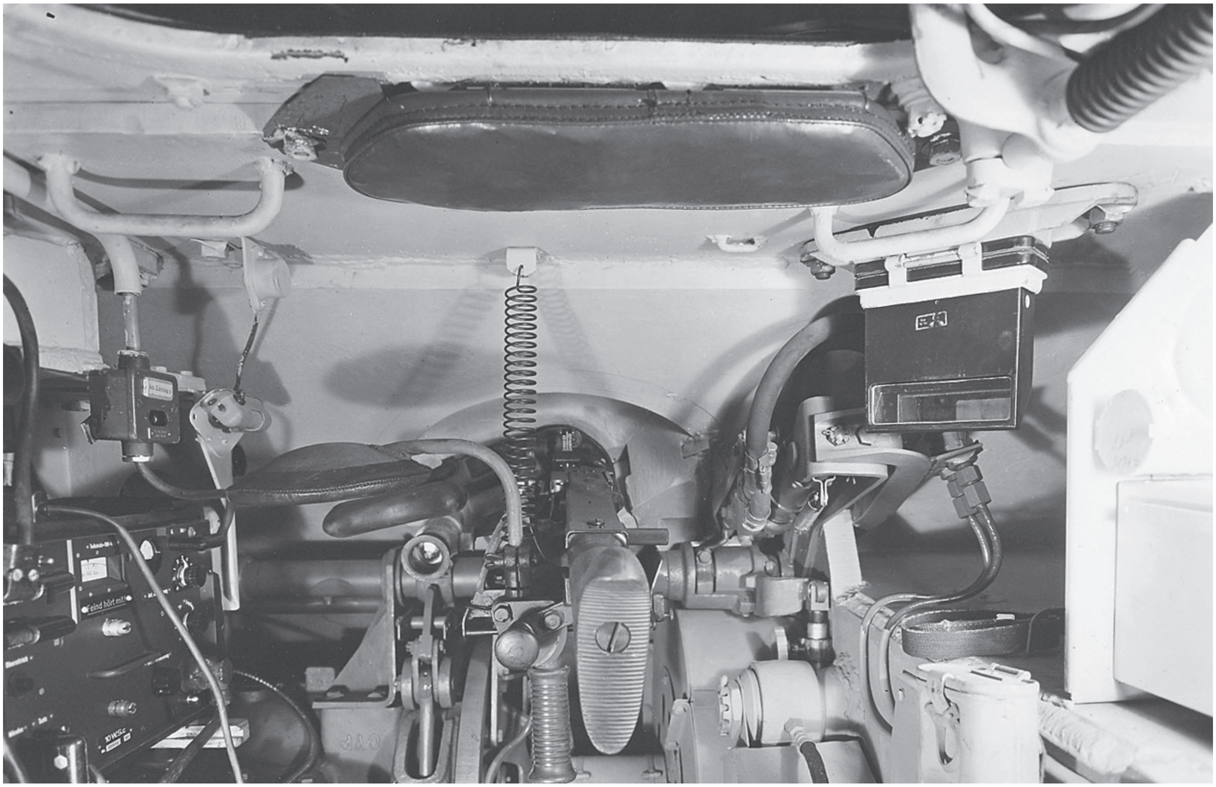
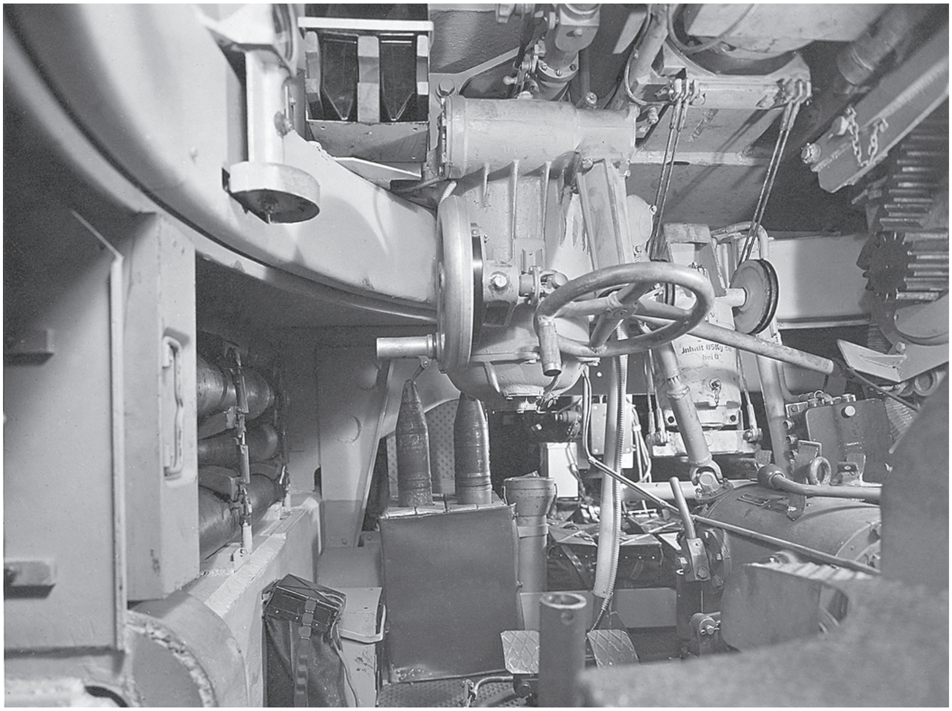
The space between the turret basket (at left) and the driver's and wireless operator's seats was used to store ammunition pouches for the two MG 34s. Any other spare space was used to store the 7.5cm ammunition. (NARA)



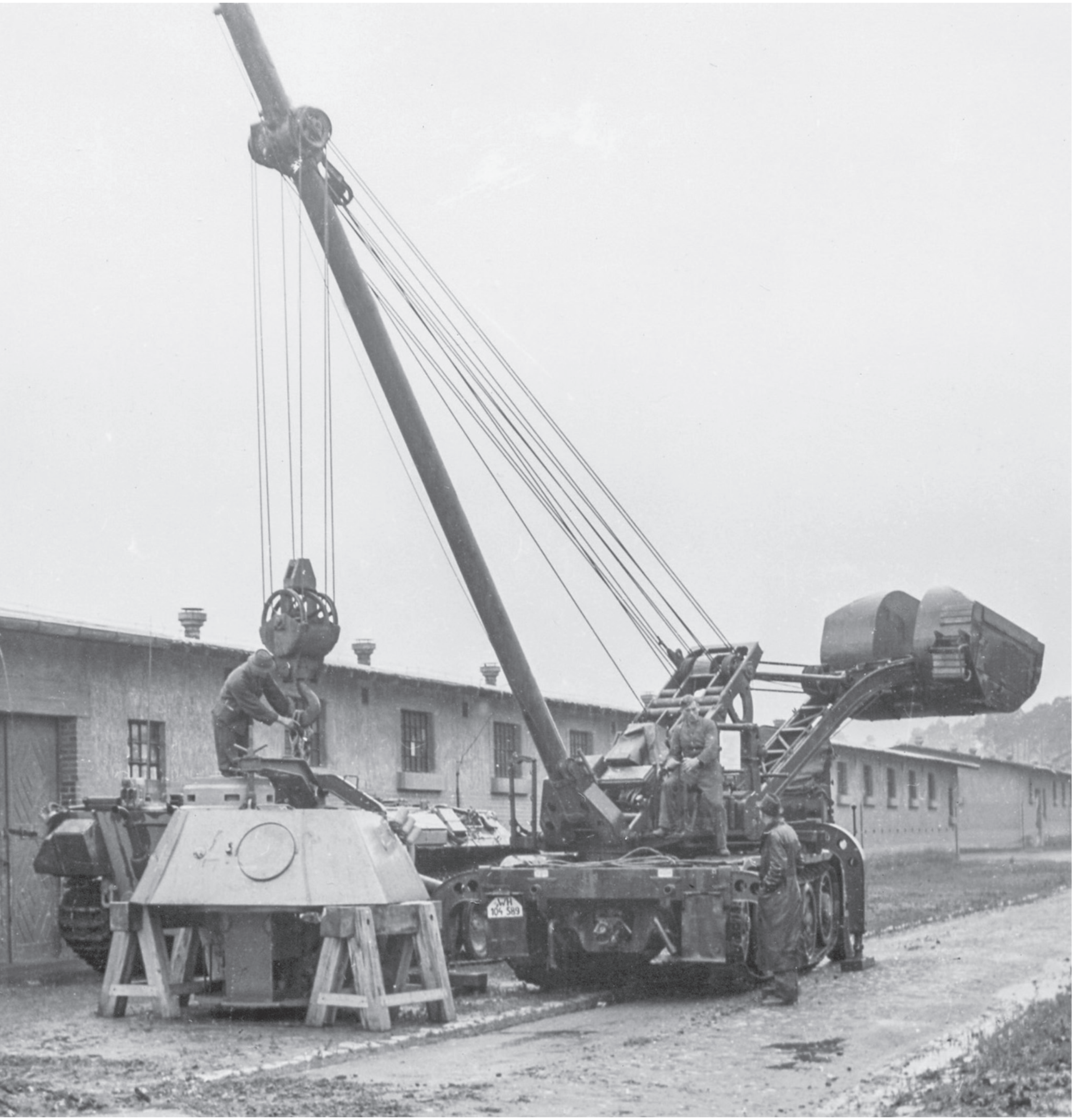
The steering levers and foot pedals in the driver's position: to the left is a steering-brake unit. (NARA)





Above:
The radio operator’s position: the radio equipment (the10W transmitter is visible) is situated to the left above the gearbox. The front MG is in position. (NARA)

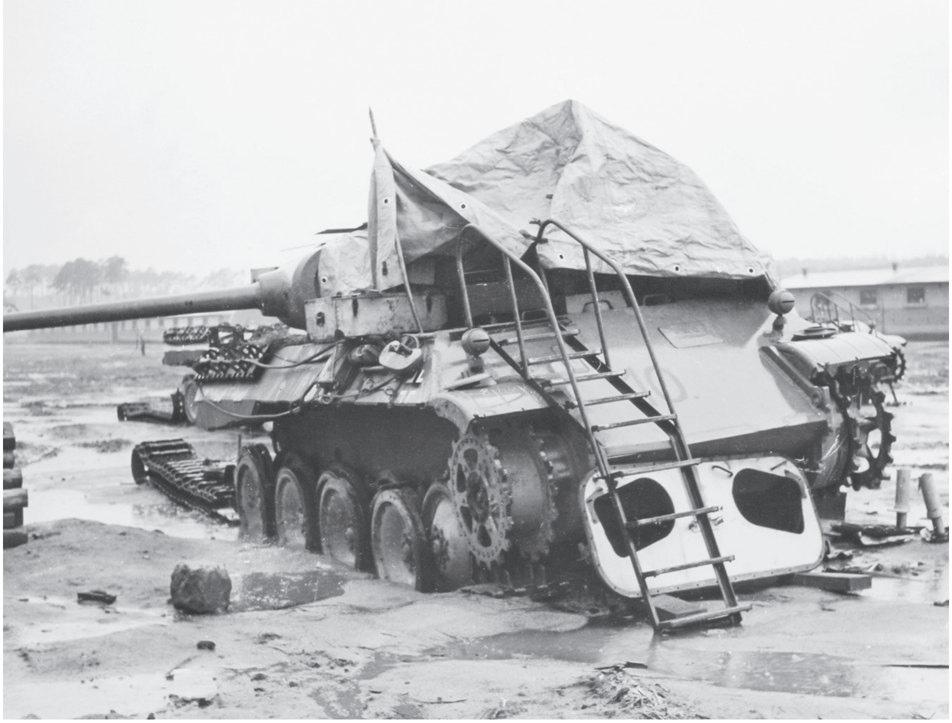
Right:
The gun aimer’s position: the gun elevation and traversing wheels are to the left of the breech block with the telescopic gunsight above. (NARA).

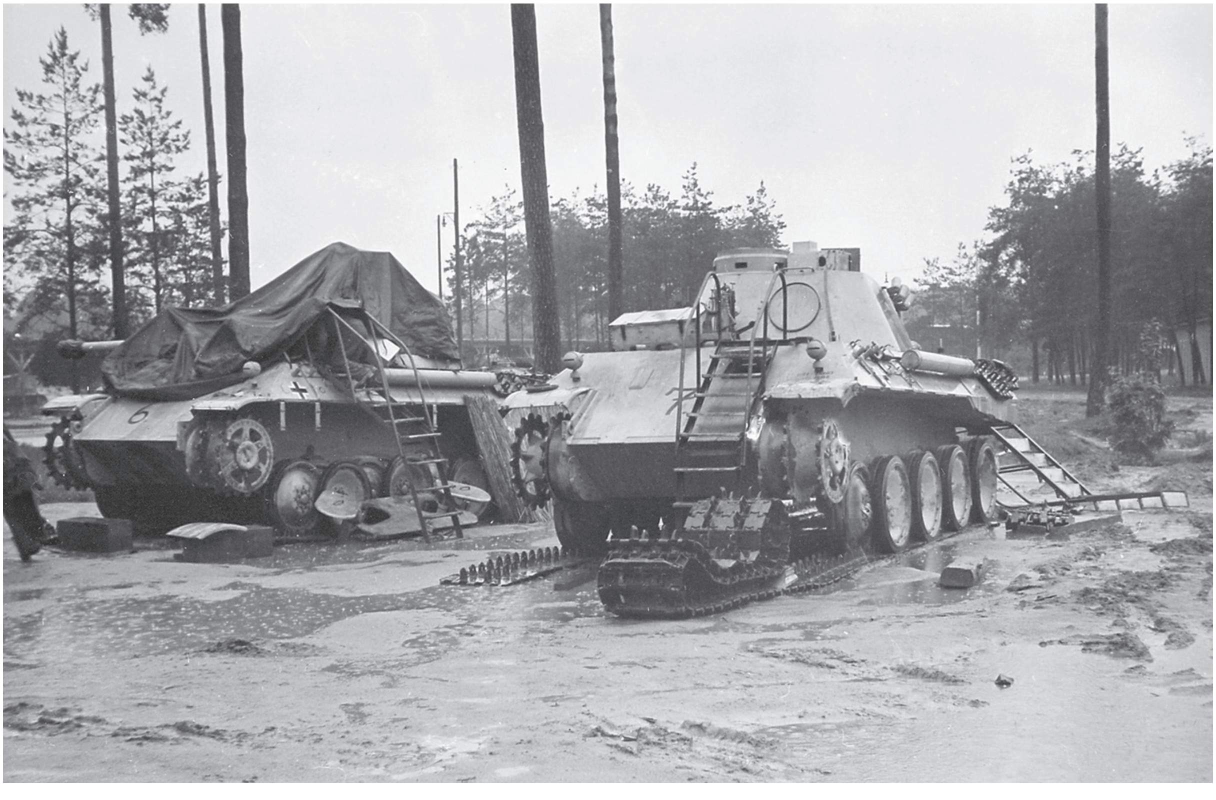


An SdKfz 9/2 fitted with a 10-ton capacity crane being used to lift the turret of a Panther onto the chassis. A heavy counterbalance was fitted to the crane to equalize the weight of the turret; for stability the vehicle was lifted and levelled by using support legs. (NARA)

Right:
To carry out work on the transmission, engineers had to remove the tracks before beginning their work. If this was carried out on wet ground a tank would simply sink in the mud or sand. (NARA)

Below:
Deliveries of the production of Panther Ausf D began before sufficient tests and trials had been completed. Between April and May 1943, the numerous defects had to be rectified by engineers working in difficult conditions. (NARA)





The Ausf F

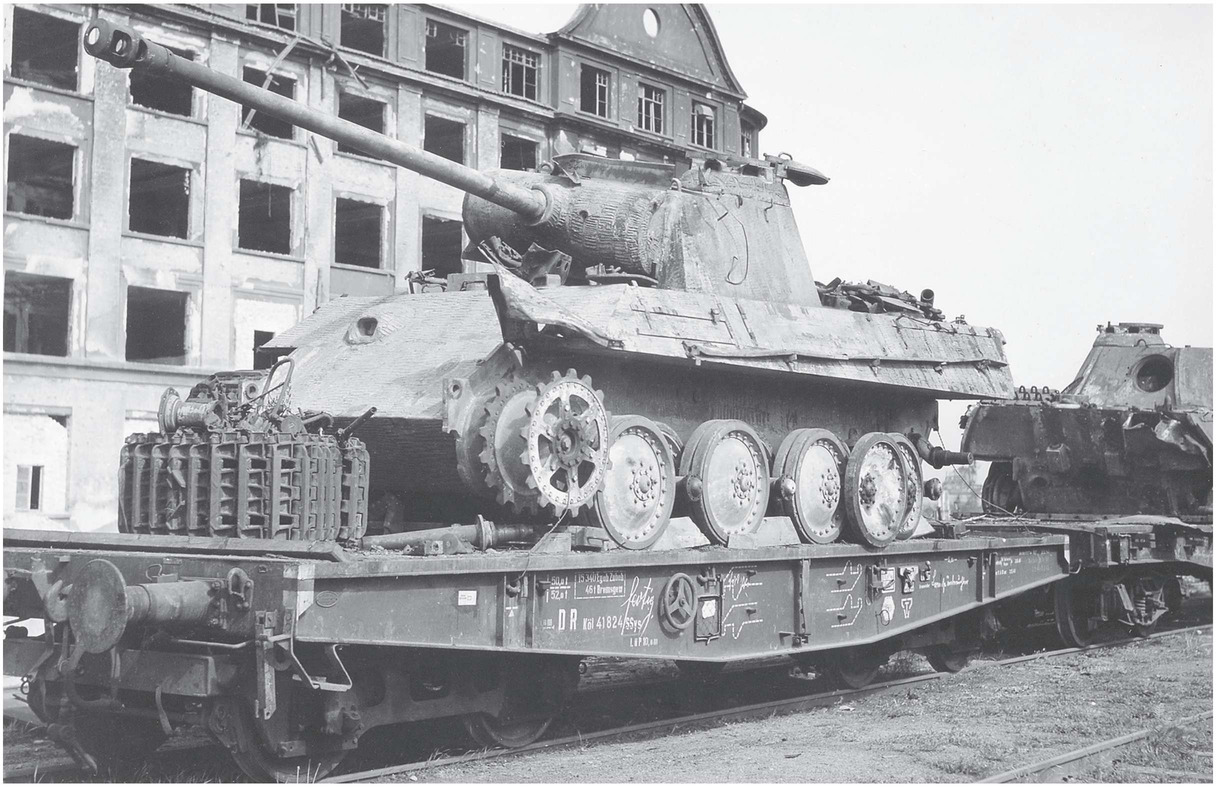
When the Panther assembly line was running at full capacity, work was undertaken to design a new turret with a much narrower forward surface. The advantage of this new shape was to greatly increase turret armour (front 120mm, sides 60mm, roof 40mm) without an increase in vehicle weight. It was planned to use the turret on a new variant, the Ausf F. In 1945, an experimental vehicle was built using an Ausf G hull, but it did not go into series production. The narrow turret had been designed to be roomy enough to mount an 8.8cm KwK 43 L/71.

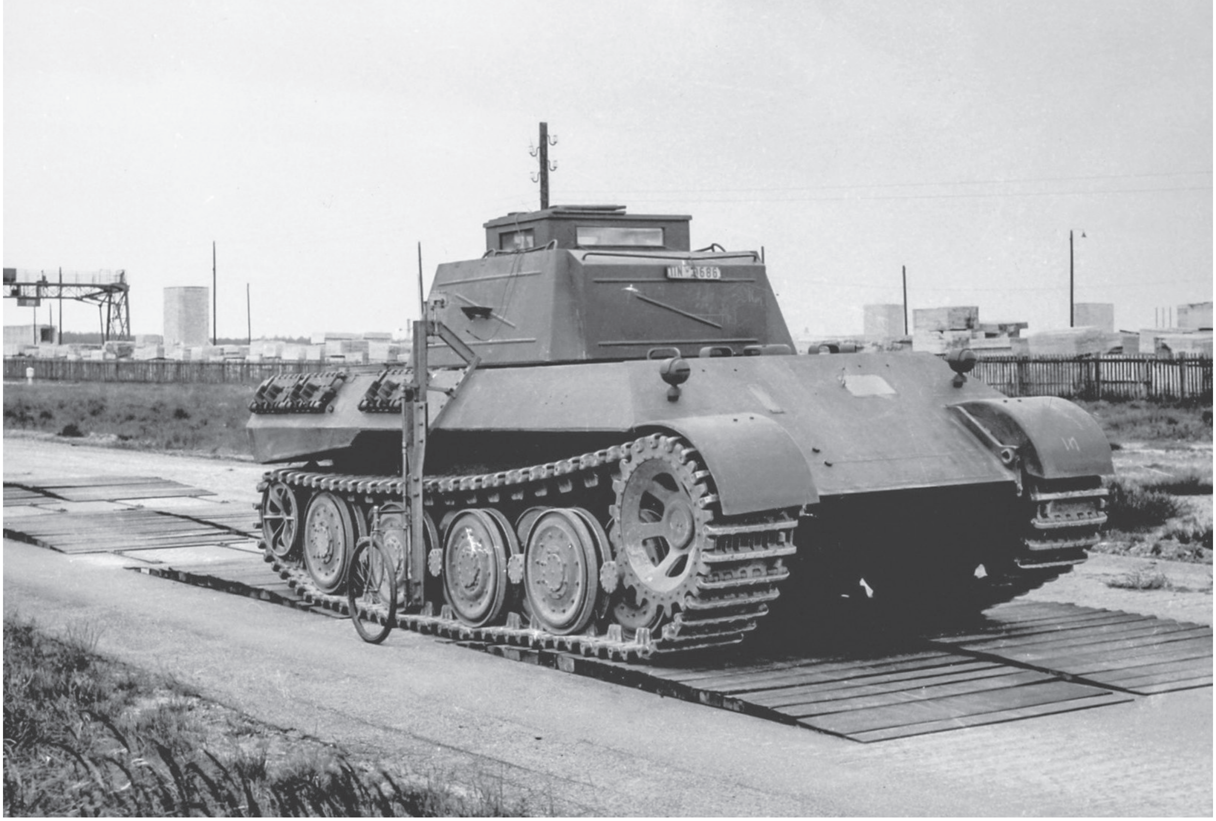
On 14 March 1943, the following report was delivered:

> GenInsp-PzTrp requests one experimental Panther mounting an 8.8cm KwK 43 L/71 as per the wooden model fitted with the 'Panther narrow/enlarged turning circle' turret displayed at Daimler-Benz on 12 December 1944. The GenInsp-PzTrp is agreed on the superstructure being different to a production version and having the turret fabricated from mild steel on a standard hull. He requests that the test vehicle is ready at the earliest possible date by using every available means and no effort to be spared.

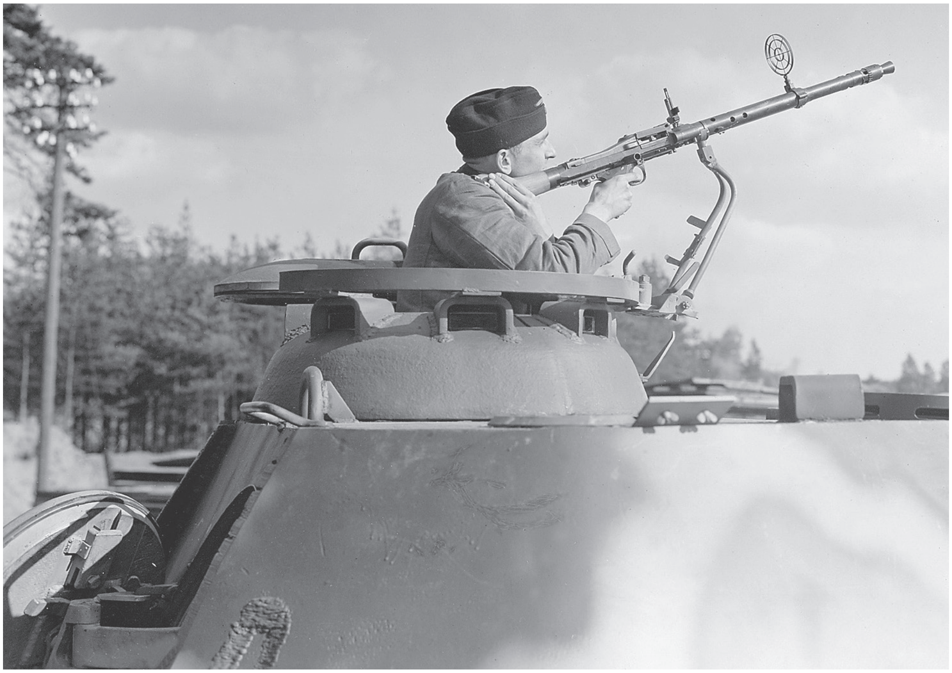
The Panther medium tank to this specification would have been a valuable asset on any battlefield. It appears highly unlikely that the requested prototype was completed by the end of the war.

Any seriously damaged tanks, such as this Panther Ausf G, that front-line engineers could not repair, were transported back to the Reich. If repair was possible, the tank would also receive a comprehensive overhaul. (NARA)

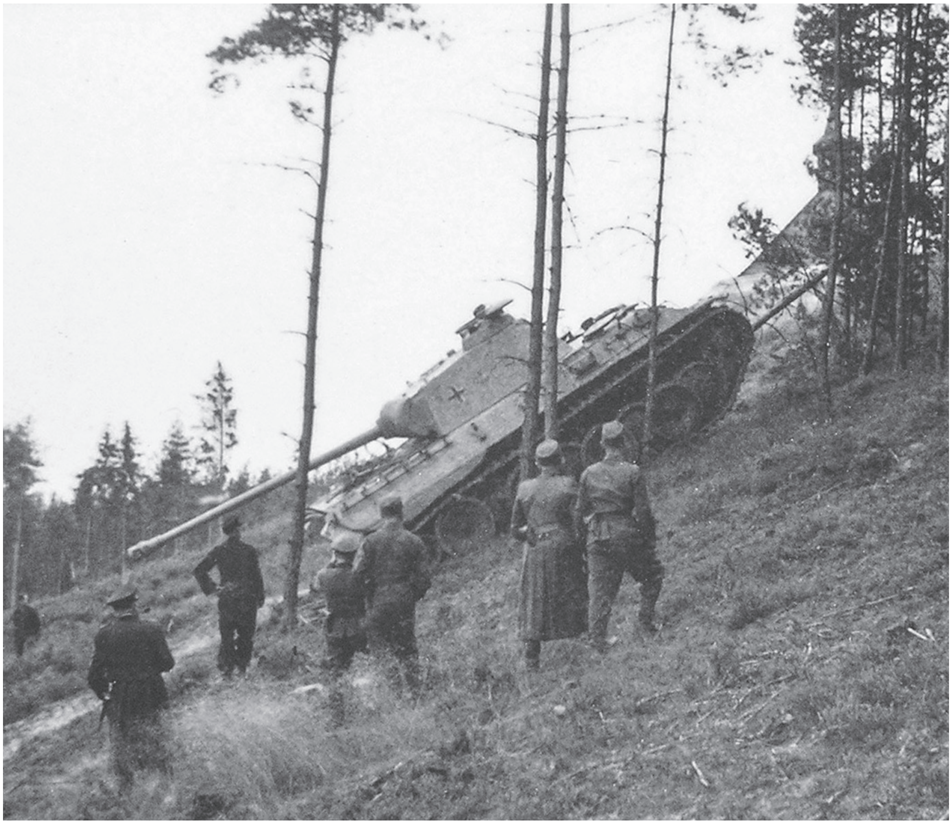




Above:
One of the first experimental vehicles was used for further trials. Components for the tracks and suspension of the later Panther II were fitted and subjected to load testing. A slave turret has been fitted for the trials. (NARA)

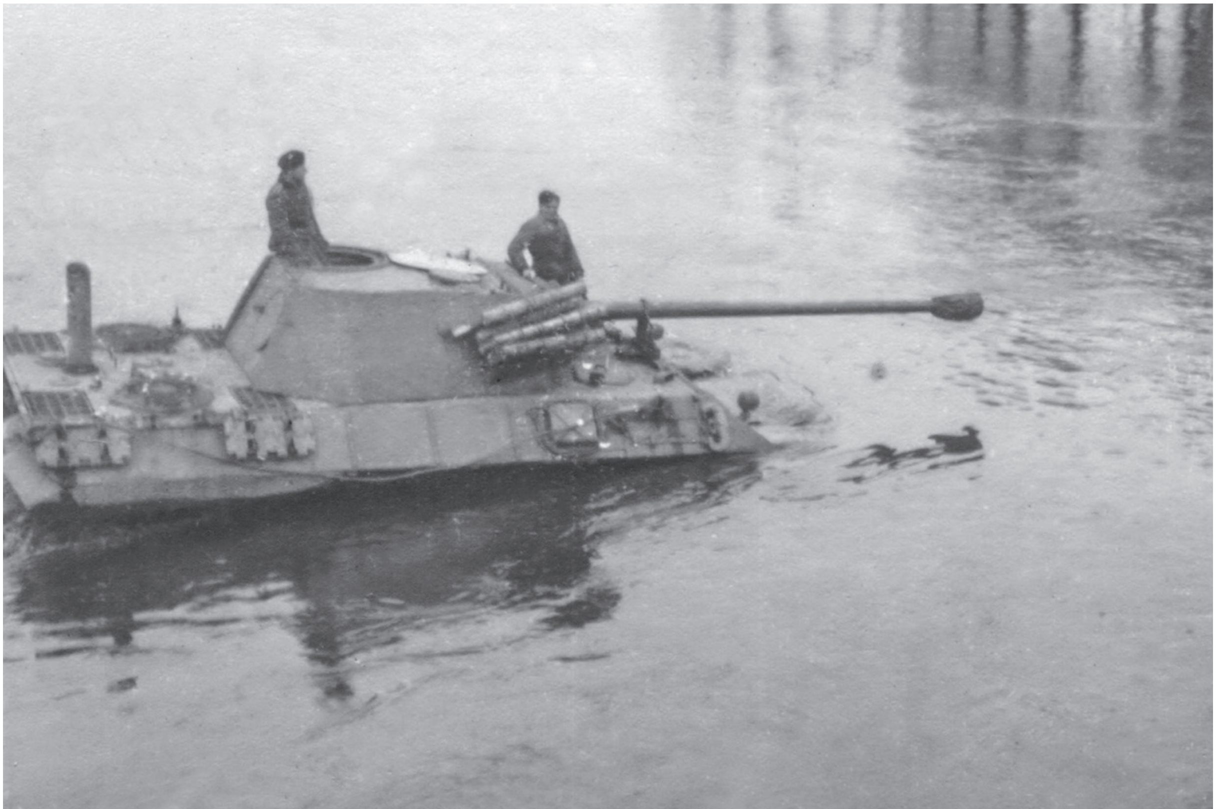


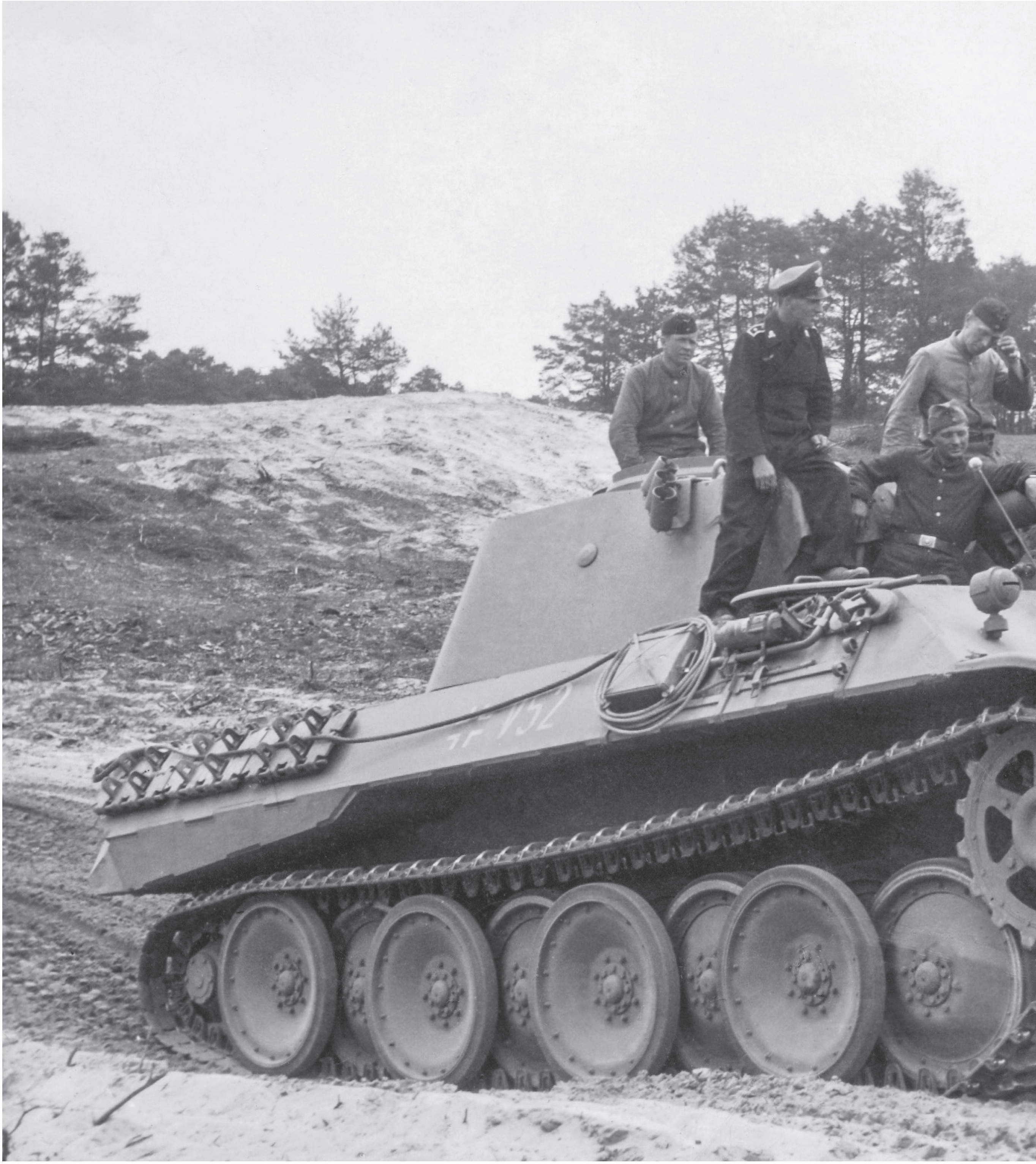
Right:
The commander of a Panther Ausf G demonstrates the anti-aircraft MG 34, but an ammunition magazine (or sack) is not fitted on the gun. The small square plate in front of the gunner was for battlefield gas recognition tables which were to have been introduced late in the war. (Historyfacts)

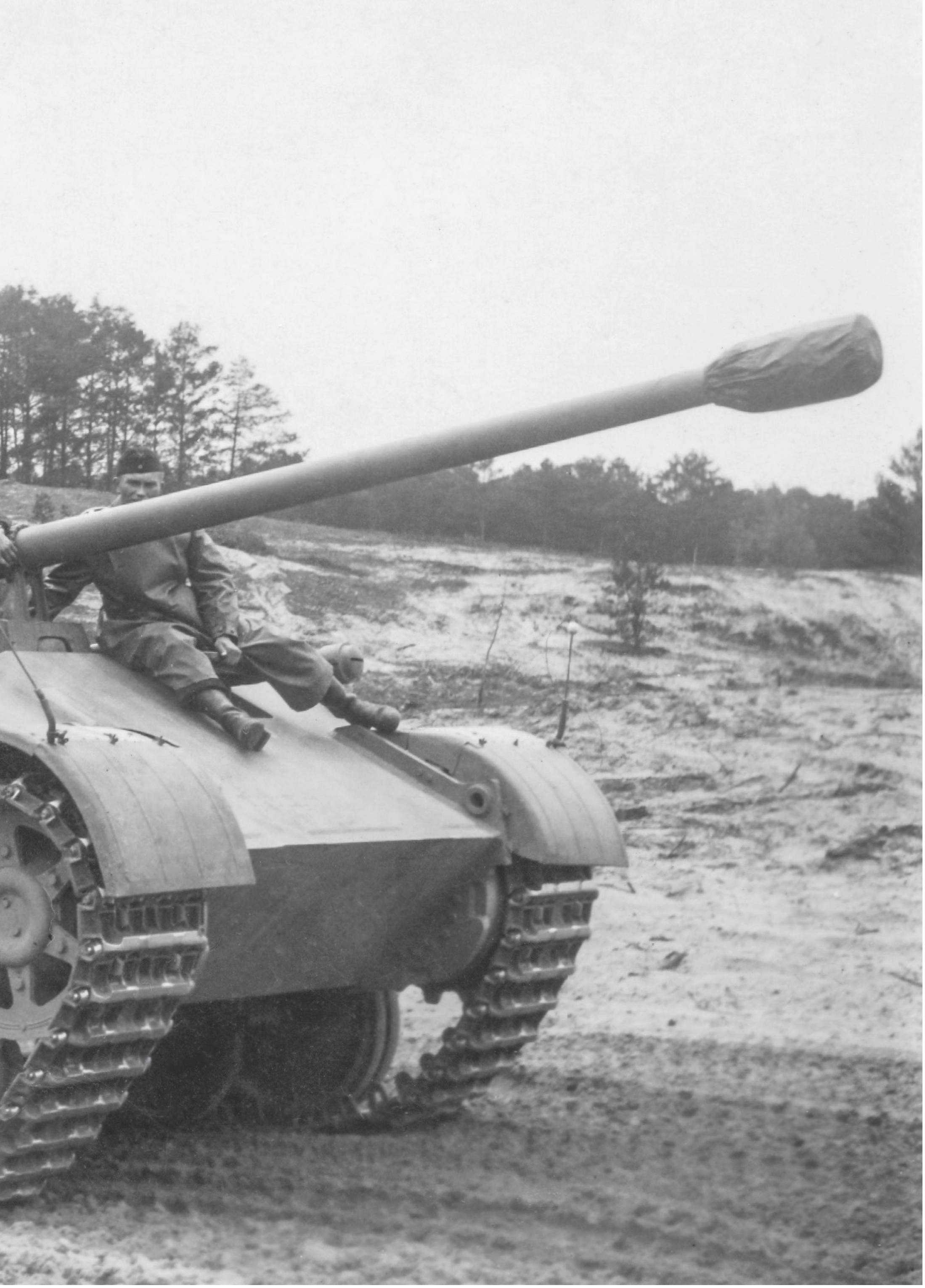


Left:
In the summer of 1944, trials were carried out with various tanks at Grafenwöhr. Here a PzKpfw V Panther, with the turret in the six o'clock position, climbs a steep slope flattening any small conifers as it ascends. (Anderson)

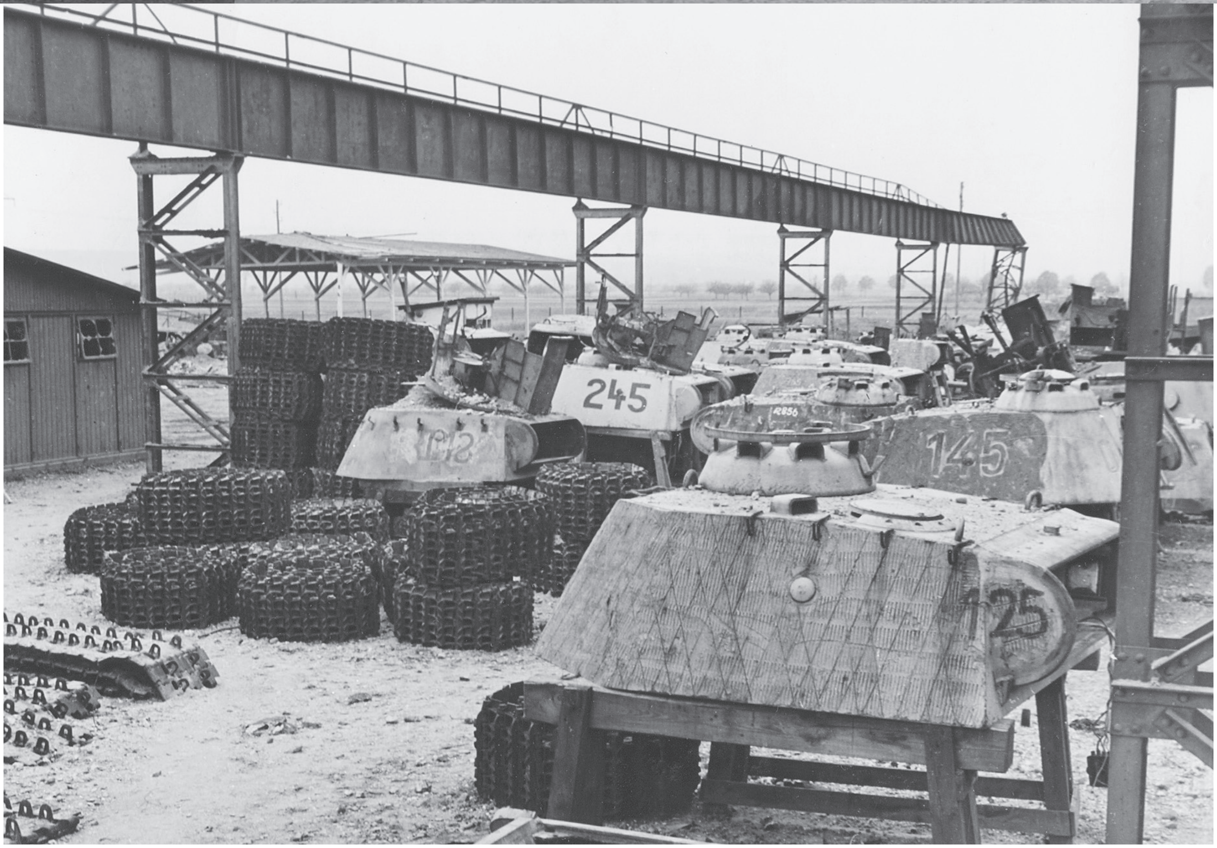
Below:
The Panther was an amphibious vehicle, which meant that the engine compartment was completely sealed against the ingress of water. A large tube, has been fitted over the air intake for the carburettors. For safety reasons during testing, the cupola has been removed from the turret. (Anderson)



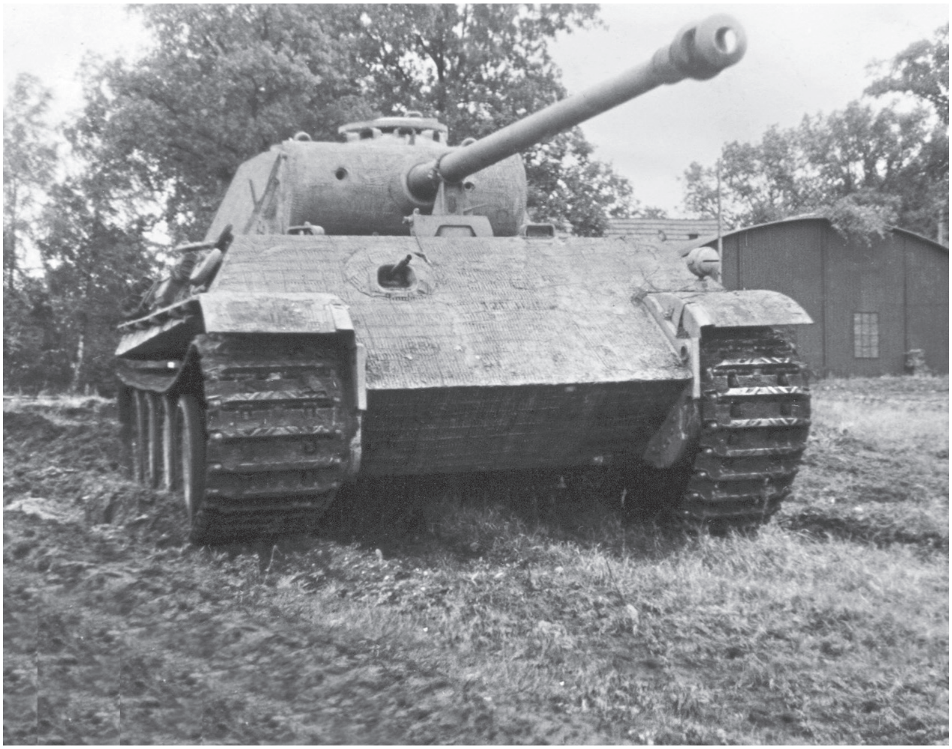

SS V52



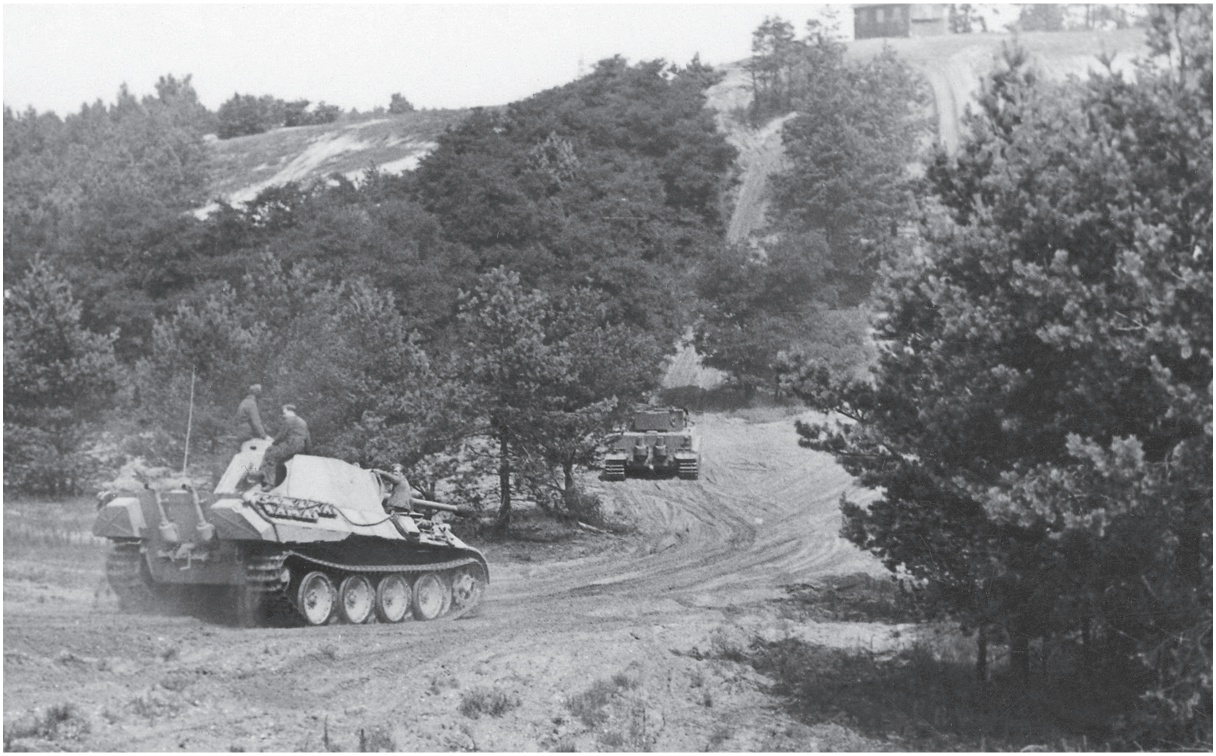
Tank ‘V52’, an early Panther Ausf D at Grafenwöhr tank testing grounds. During trials many problems were identified and documented for rectification. The tank is fitted with smoke-candle dischargers, but does not have the mounting brackets for fitting side aprons. (Anderson)

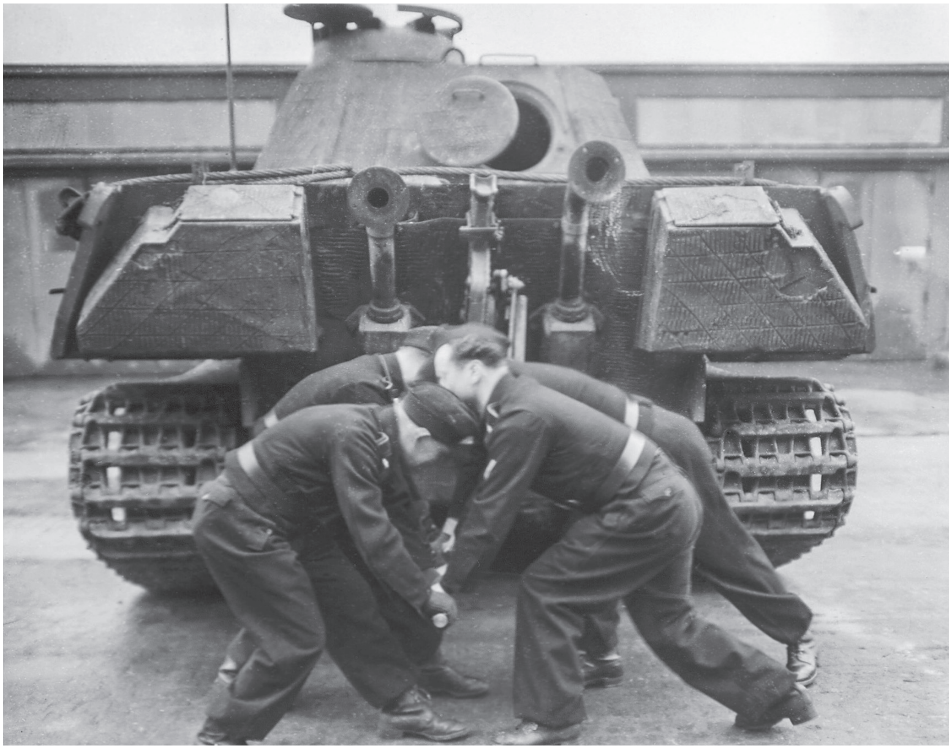


Above:
A yard at Siebert AG containing turrets, track and other parts from damaged tanks was found by US troops. After questioning a number of workers they found that the turrets would be refurbished then sent to companies producing the Panther. Sibert AG converted any usable hulls into recovery tanks. (NARA)



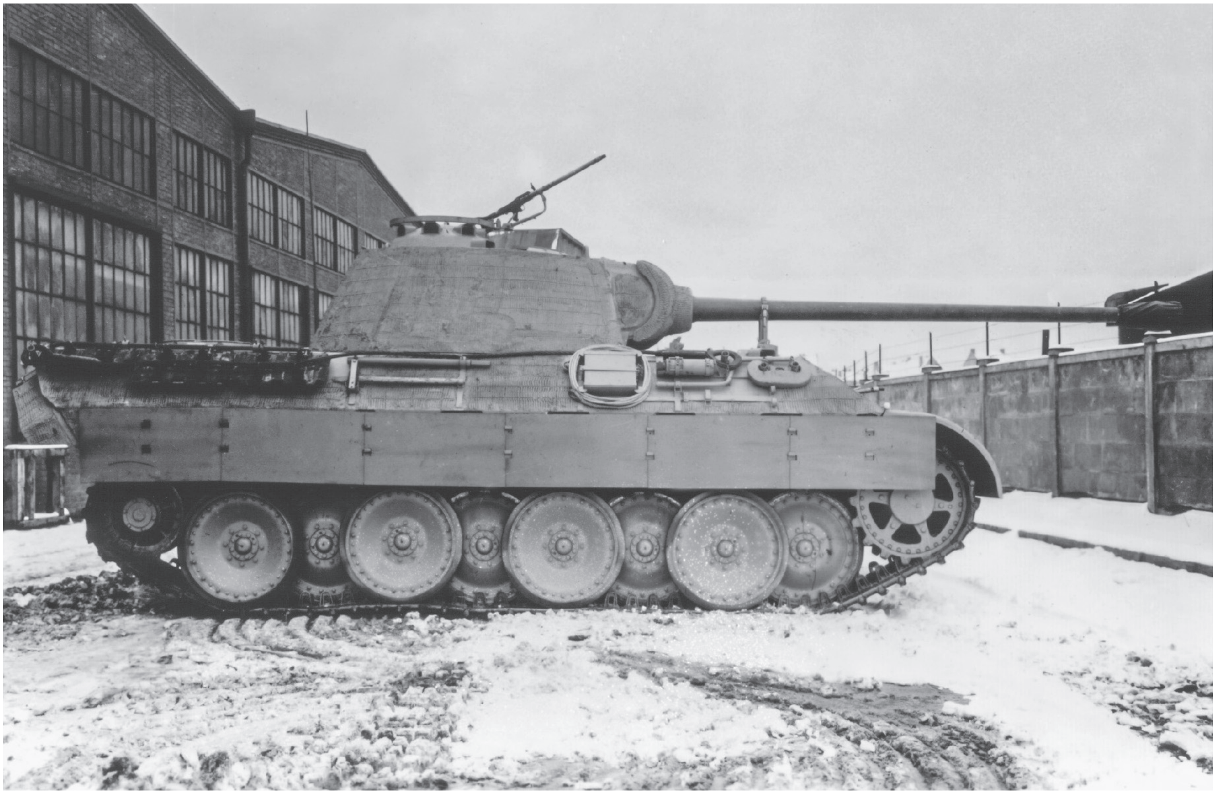
Right:
In the spring of 1944, all PzKpfw V Panther production was transferred to Ausf G. While the hull was heavily modified (the driver's hatch removed, and simplified reinforcement to the hull sides) the turret remained basically unchanged. (Historyfacts)





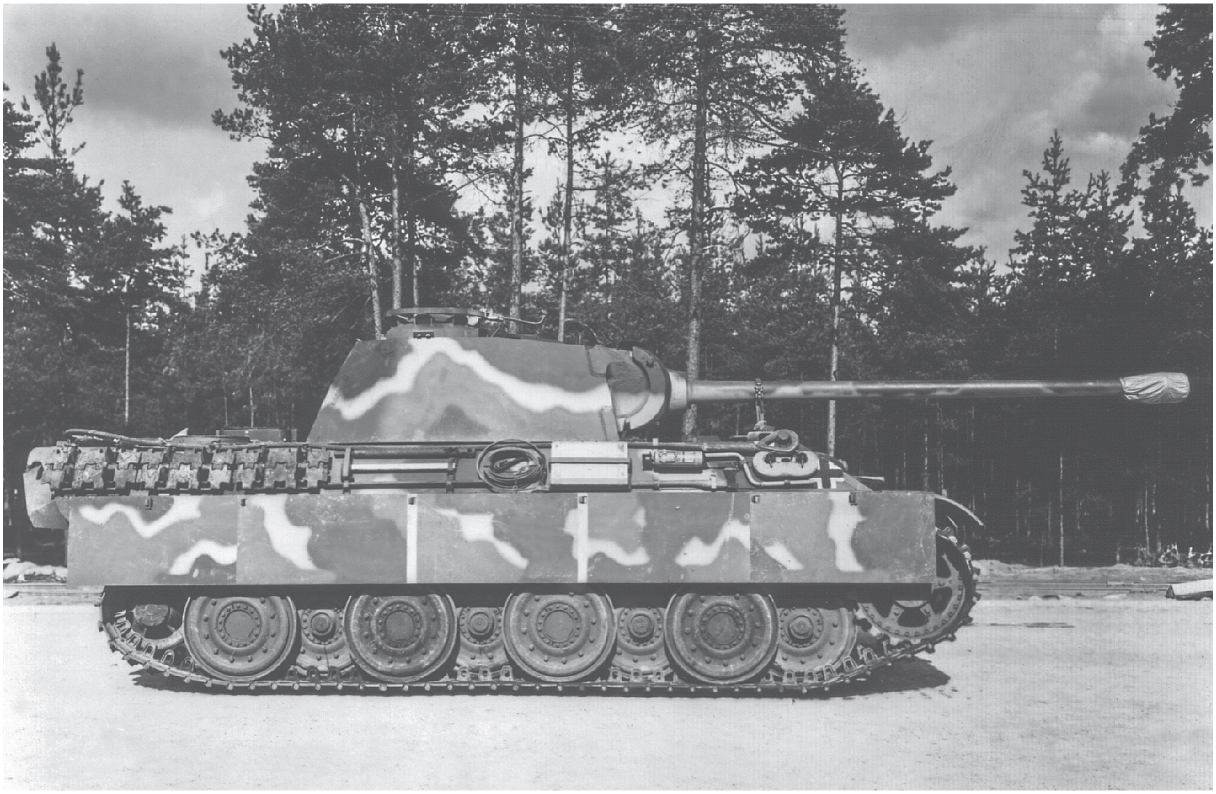
Above:
The PzKpfw V Panther and the PzKpfw VI Tiger Ausf E were displayed to the minister of armaments at Grafenwöhr. (Anderson)

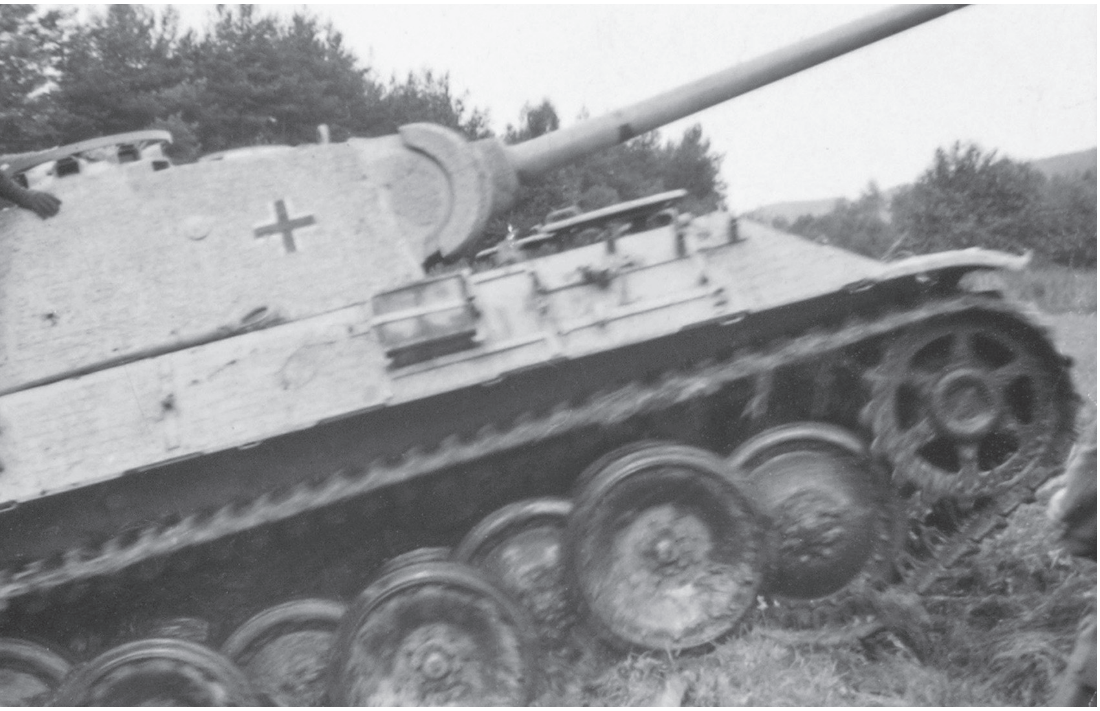
Left:
Starting the engine manually required the efforts of at least four men. The purpose of the round flanges on the end of the each exhaust pipe is not known. (Historyfacts)



Above:
A Panther Ausf A: Note the better-shaped commander's cupola manufactured from cast steel. The vehicle has received a coat of Zimmerit anti-magnetic paste. An MG 34, for anti-aircraft defence, has been mounted on the cupola. During production, the pressed rims on the outer running wheels were reinforced using a large number of screws. (Historyfacts)

Right:
A low gear and plenty of engine revolutions will be required to drive this Panther out of this very soft ground. (Anderson)





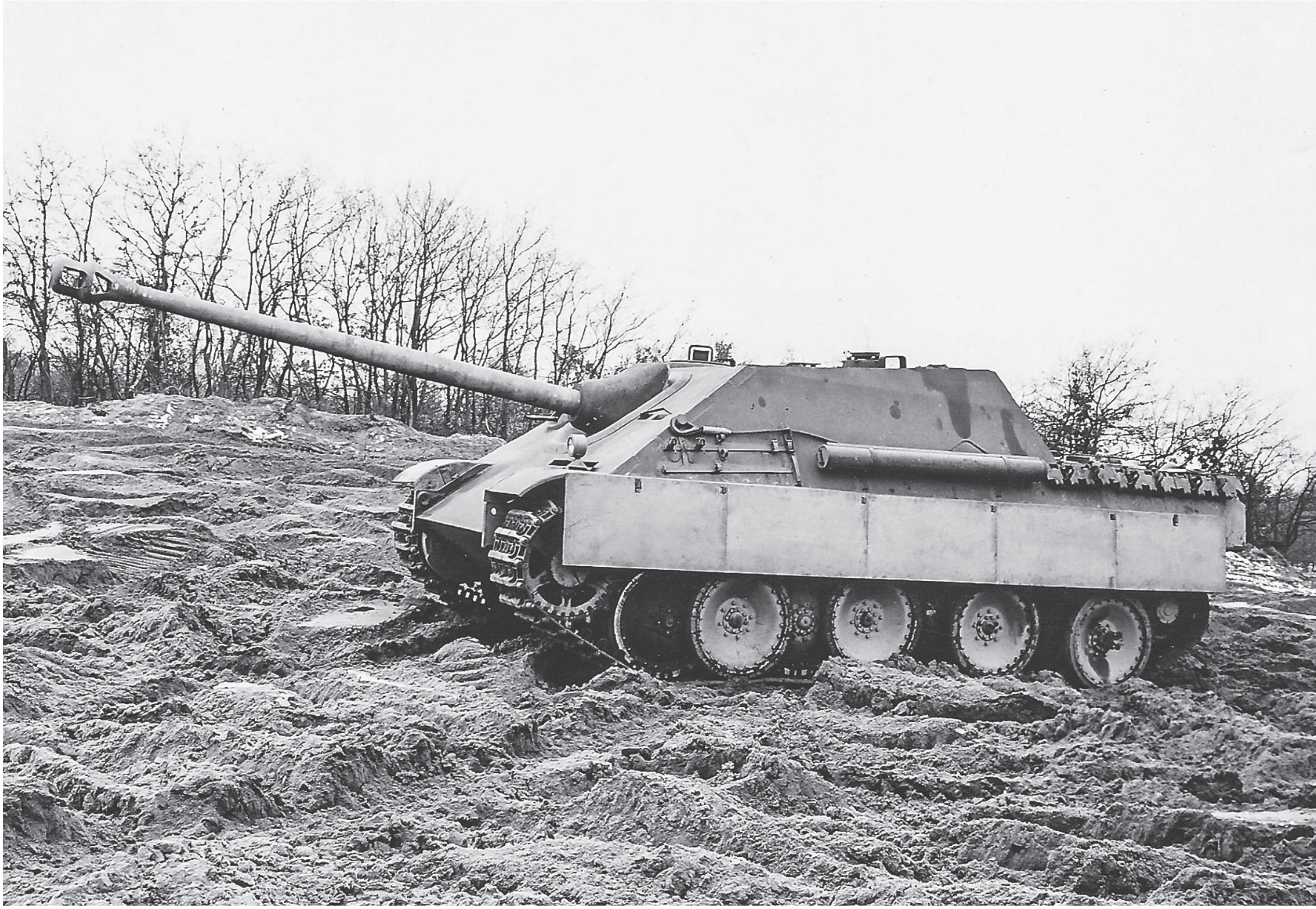
Above:
From September 1944, Zimmerit was no longer applied during production of the Ausf G. Some vehicles were fitted with 'Russian rollers' (all-steel roadwheels) in a belated attempt to economize on the usage of rubber. The tank is camouflaged in dark green with dark yellow and brown stripes. (Historyfacts)

Left:
A Panther climbs up the soft bank of a small stream. Note the tautness of the upper track. (Anderson)

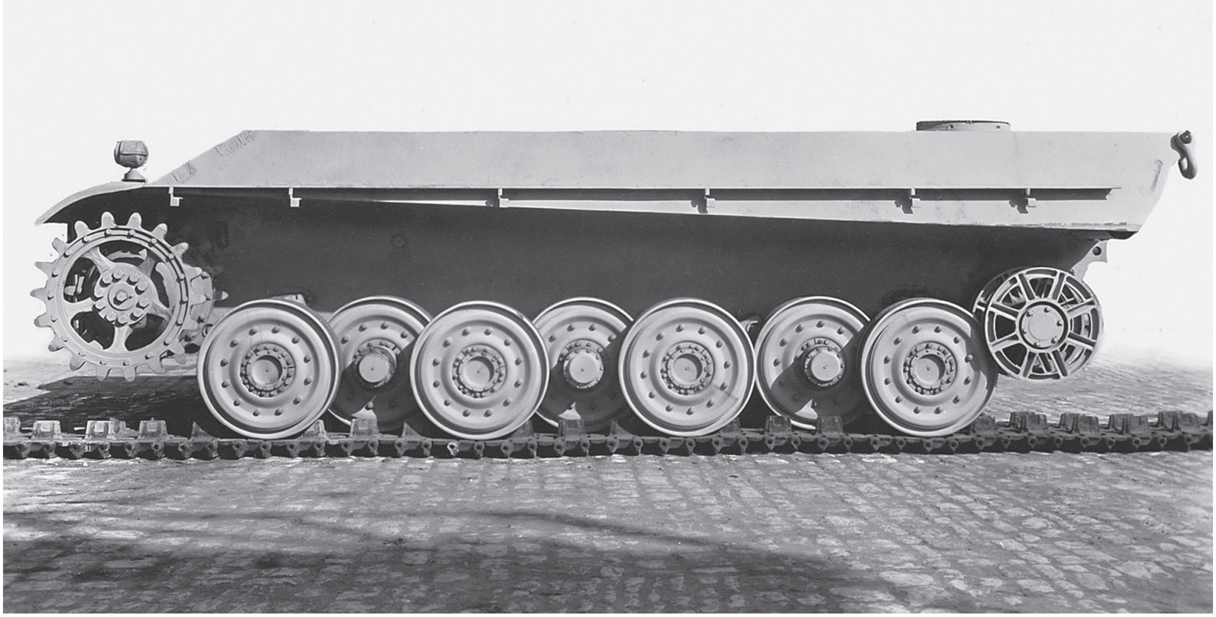
The *Jagdpanther* (SdKfz173)

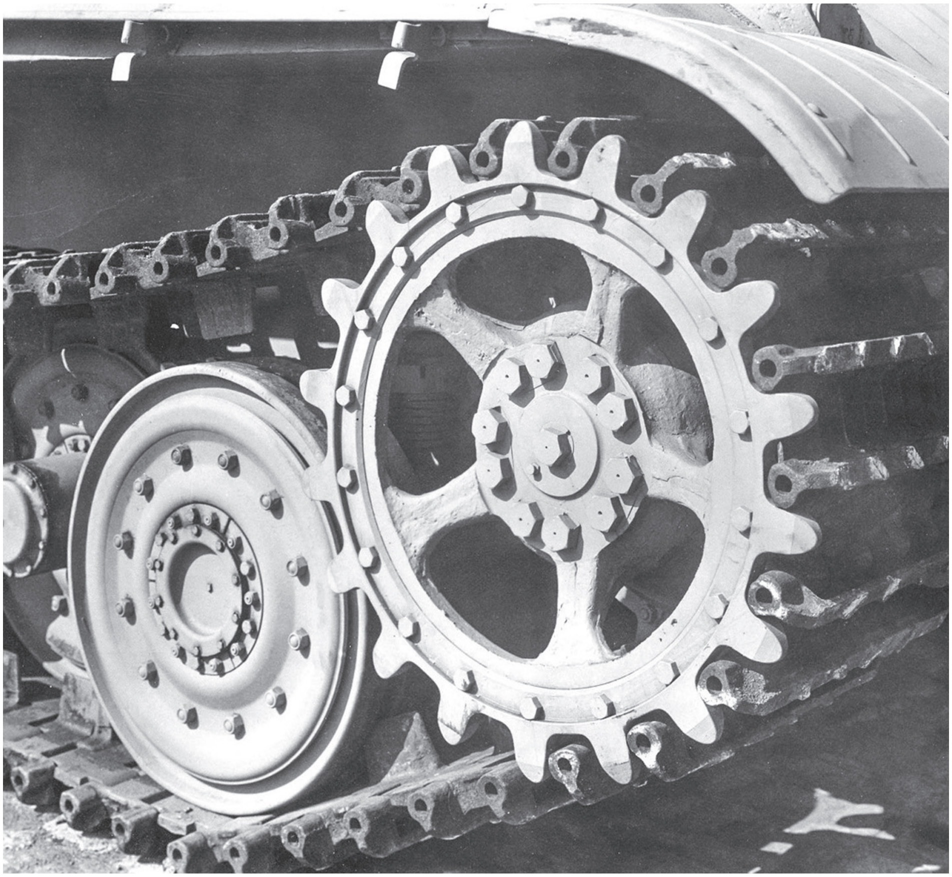
In 1942, a new self-propelled assault gun was required for delivery in 1943, to provide the assault artillery and armoured anti-tank units (*Jagdpanzer/Panzerjäger*) with a superior vehicle. At the beginning of Panther development, consideration was given to using the chassis as the basis for a new self-propelled assault gun. During the discussions to replace the Panther I with the Panther II, a much more heavily armoured type was chosen. The configuration was a casemate-type tank with 100mm frontal armour and 60mm at the sides based on the chassis of the Panther I. It was decided to use the 8.8cm KwK 43/3 L/71, the most powerful tank gun of the time, and this was mounted in a large fixed (casemate) superstructure.

The result was a vehicle with sloped armour and a level of protection that matched the Panther. Originally known as the *Jagdpanzer* during development, it was finally decided to call it the *Jagdpanther*. Some 471 had been produced by the end of the war.



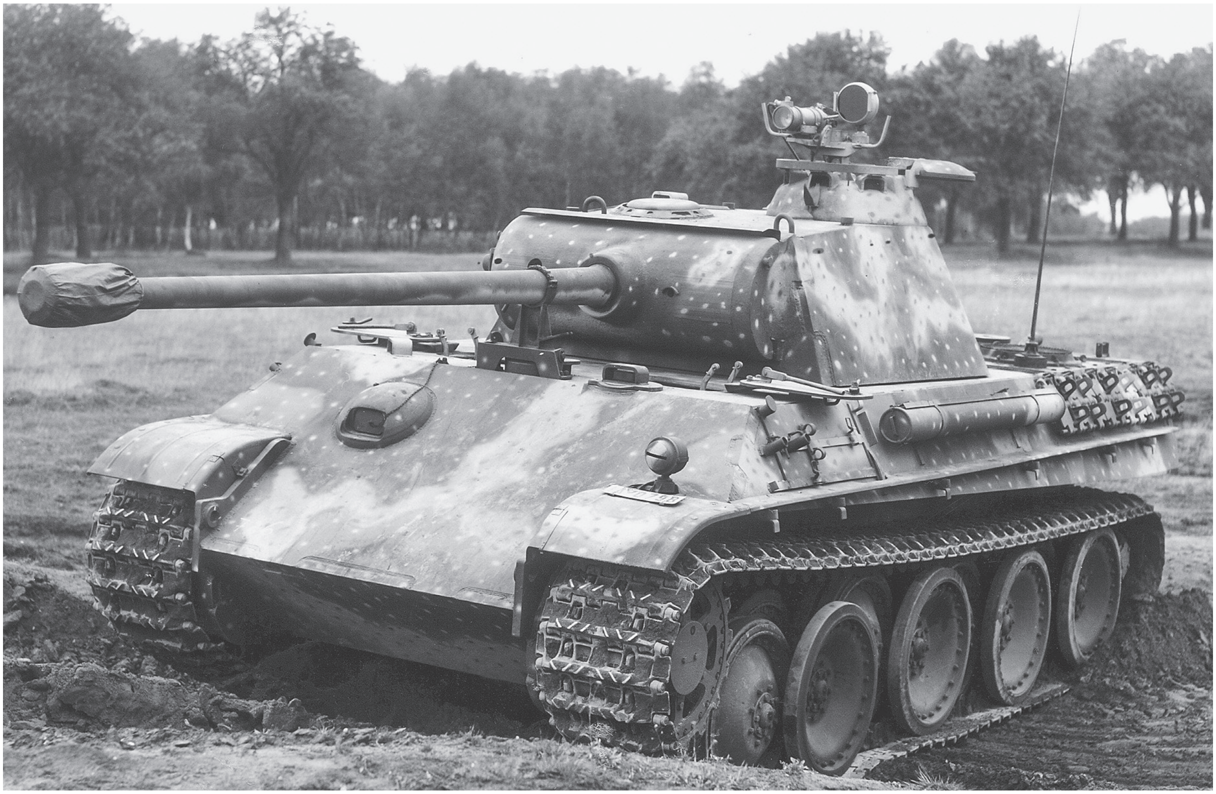
The *Jagdpanther* (SdKfz 173) combined the powerful 8.8cm KwK 43/3 L/71 with the highly-manoeuvrable chassis of the Panther. (Anderson)

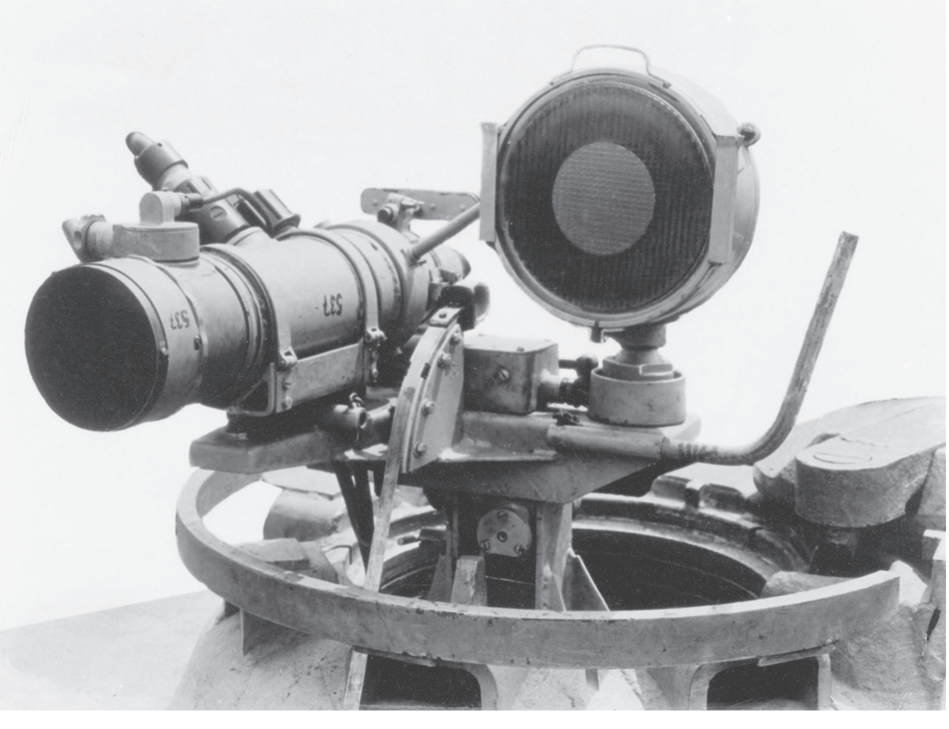




Above:
The Panther II was the planned successor to the Panther I and was developed at the beginning of 1943. The running gear now had seven instead of eight roadwheels (to economize on rubber) and distinctly larger tracks. (Historyfacts)

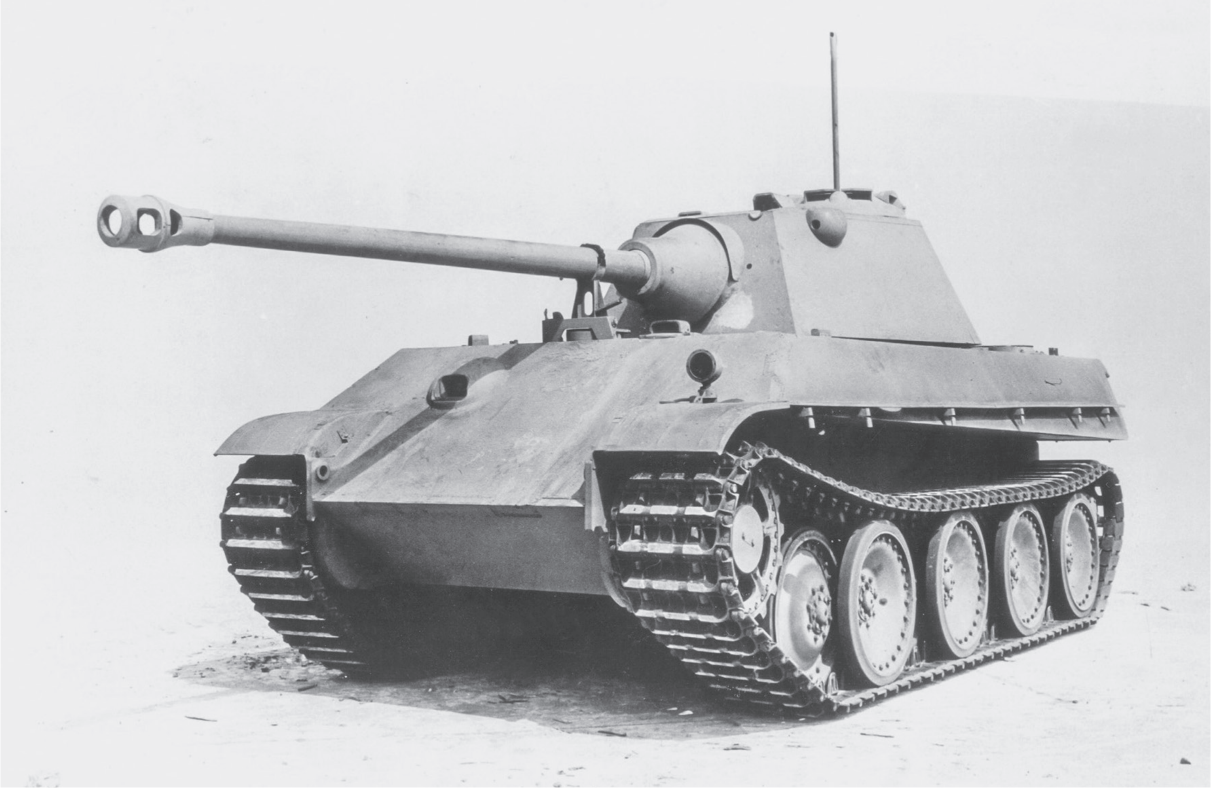
Left:
The Panther II drive sprocket was basically designed for the Tiger II. The narrow track, shown here, was used on the Tiger when transported by rail. (Historyfacts)

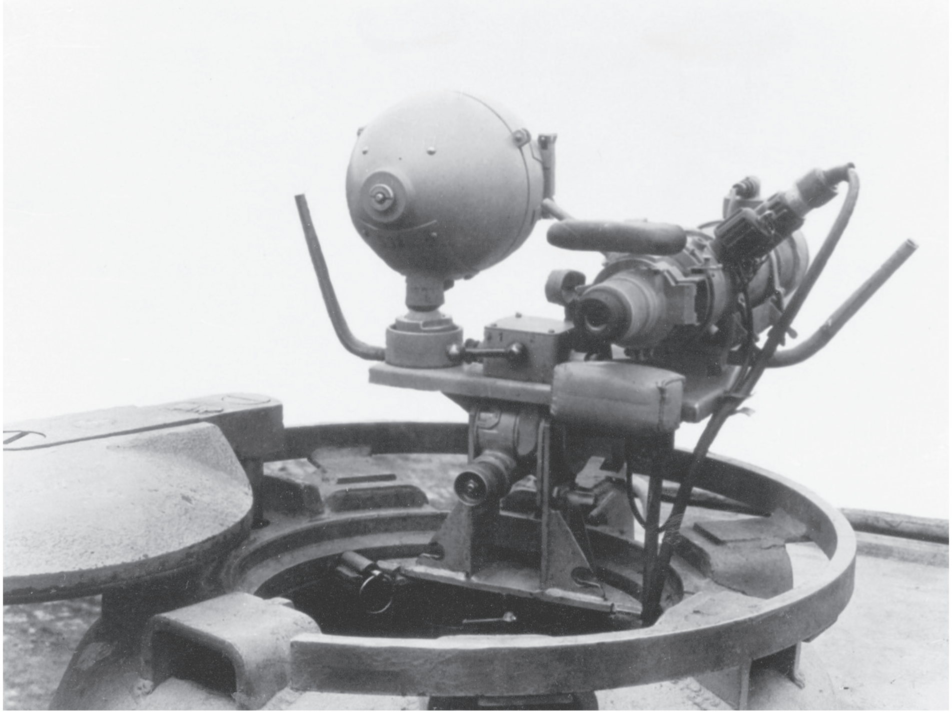




Above:
In 1943, infra-red equipment for night operation became available after a lengthy period of development. An infra-red searchlight with sight (Fg 1250) has been mounted on the cupola of a PzKpfw V Panther Ausf G. (Historyfacts)

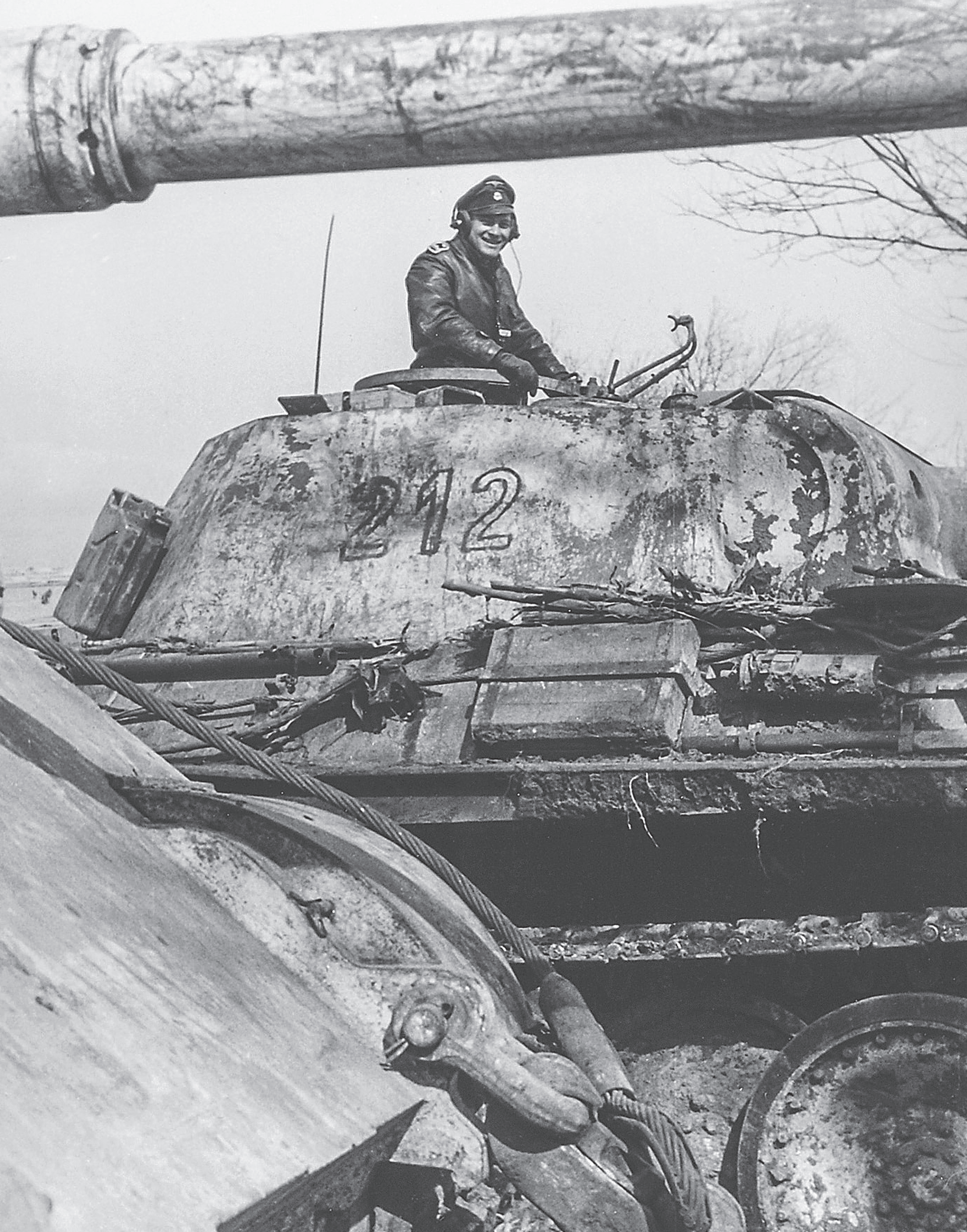
Right:
In action the commander would observe the target. Traversing directions were passed to the gun aimer by intercom. Gun elevation indications were taken from steel tape passed through the turret roof to an indicator, where the data was interpreted by the gun aimer. (Historyfacts)





Above:
In the spring of 1945, a *Schmalturm* (small turret) was designed for the Panther and fitted on an Ausf G hull, and would probably have gone into production as the Ausf F. The turret was equipped with a rangefinder and a fixed periscope in the cupola. (Historyfacts)

Left:
Few Panther units were fitted with infra-red equipment. According to reports, engagements using it occurred at Lake Balaton, Hungary, around Berlin and on Luneburg Heath, but no official confirmation has been found. (Historyfacts)


212

Organization of Panther Units

5

The first Panther units appeared in 1943, but due to the low production figures, it was never possible to equip a tank regiment entirely with the Panther: one battalion would have the Panther, the other continued with the PzKpfw IV.

New Organizational Structures

German military units were organized to standardized schemes. The KStN determined the structure of a unit and the allocation of personnel, weapons and equipment. Whereas the *Kriegsausrüstungnachtweis* (KAN – war equipment records) had a much more detailed list including typewriters to spanners. These structural arrangements were reviewed critically after their introduction and changed if necessary. Experience reports from front-line troops were included.

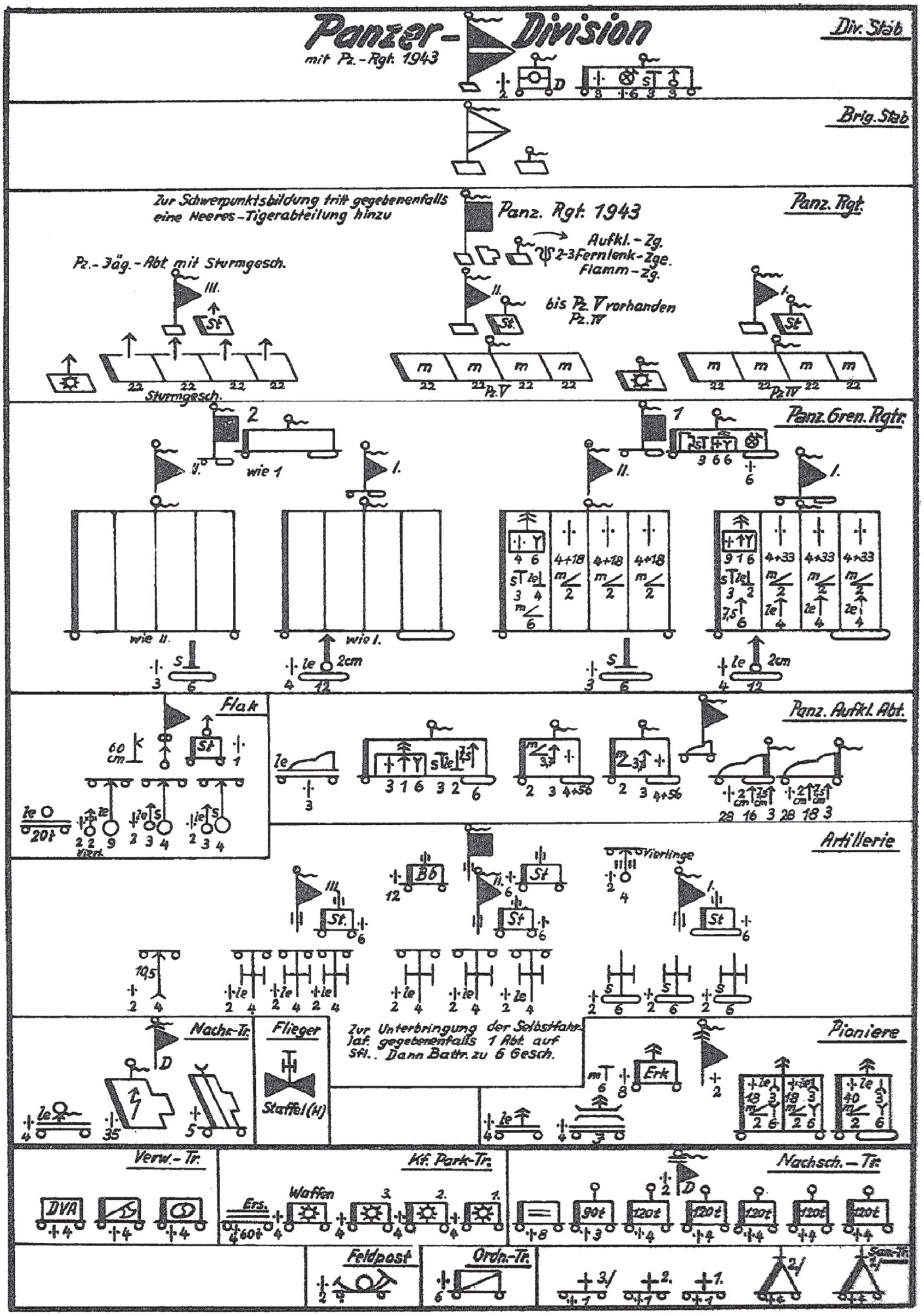
For the sake of clarity, the graphics reproduced are orientated towards the KStN. The representation of a clear chronological sequence is hardly possible because as new detailed statements appeared, previous reports were thrown out.

A document issued by *Wehrkreiskommando* XVII (Vienna), dated 12 January 1943, describes the forming of the first unit to be equipped with the Panther:

> Re: Forming PzAbt 51 (Panther)
>
> 1.) The Army PzAbt about to be formed according to the reference will receive the designation PzAbt 51 (Panther).
>
> 2.) Structure

Staff	with three PzKpfw V
Staff company	with reconnaissance platoon, six PzKpfw V and repair staff

A Panther Ausf G, turret number 212, has the thicker gun mantlet and no Zimmerit, which indicates that it is from a very late production batch. (Anderson)


Panzer-Division
mit Pz.-Rgt. 1943
Div. Stab
Brig. Stab
Zur Schwerpunktsbildung tritt gegebenenfalls eine Heeres-Tigerabteilung hinzu
Panz. Rgt. 1943
Panz. Rgt.
Aufkl.-Zg.
2-3 Fernlenk-Zge.
Flamm-Zg.
Pz.-Jäg.-Abt. mit Sturmgesch.
bis Pz. V vorhanden Pz. IV
Sturmgesch.
Pz. V
Pz. IV
Panz. Gren. Rgtr.
wie 1
wie II.
wie I.
2cm
Flak
Panz. Aufkl. Abt.
Artillerie
Vierlinge
Nachr.-Tr.
Flieger
Staffel (H)
Zur Unterbringung der Selbstfahrlaf. gegebenenfalls 1 Abt. auf Sfl.. Dann Battr. zu 6 Gesch.
Pioniere
Erk
Verw.-Tr.
DVA
Kf. Park-Tr.
Waffen
Ers.
Nachsch.-Tr.
Feldpost
Ordn.-Tr.
San-Tr.

Panzer Division 43 introduced new basic changes. This plan foresaw the need of special weapons for the staff company, and for the first time the artillery company would receive self-propelled armoured guns. These changes would gradually be altered.

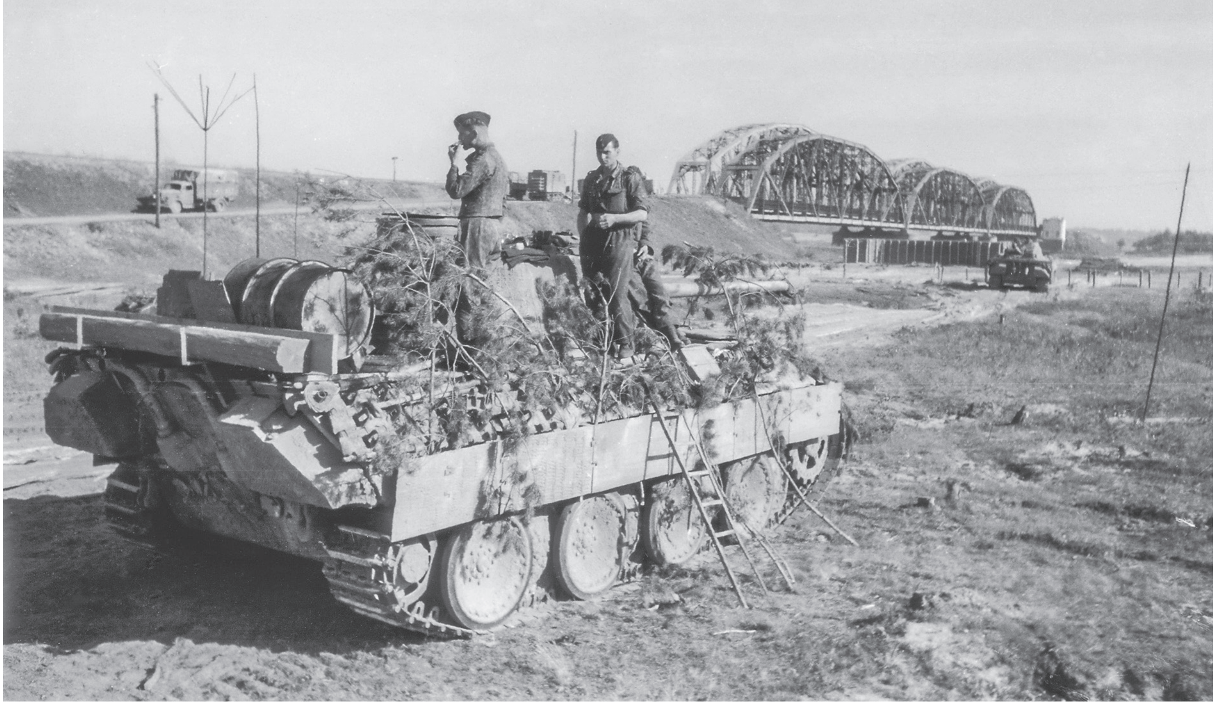
Four tank companies	Allocated 19 PzKpfw V divided up as: Company troop with three PzKpfw V and four platoons, each with four PzKpfw V (total 19) and a workshop platoon

3.) The following KStN and KAN apply:

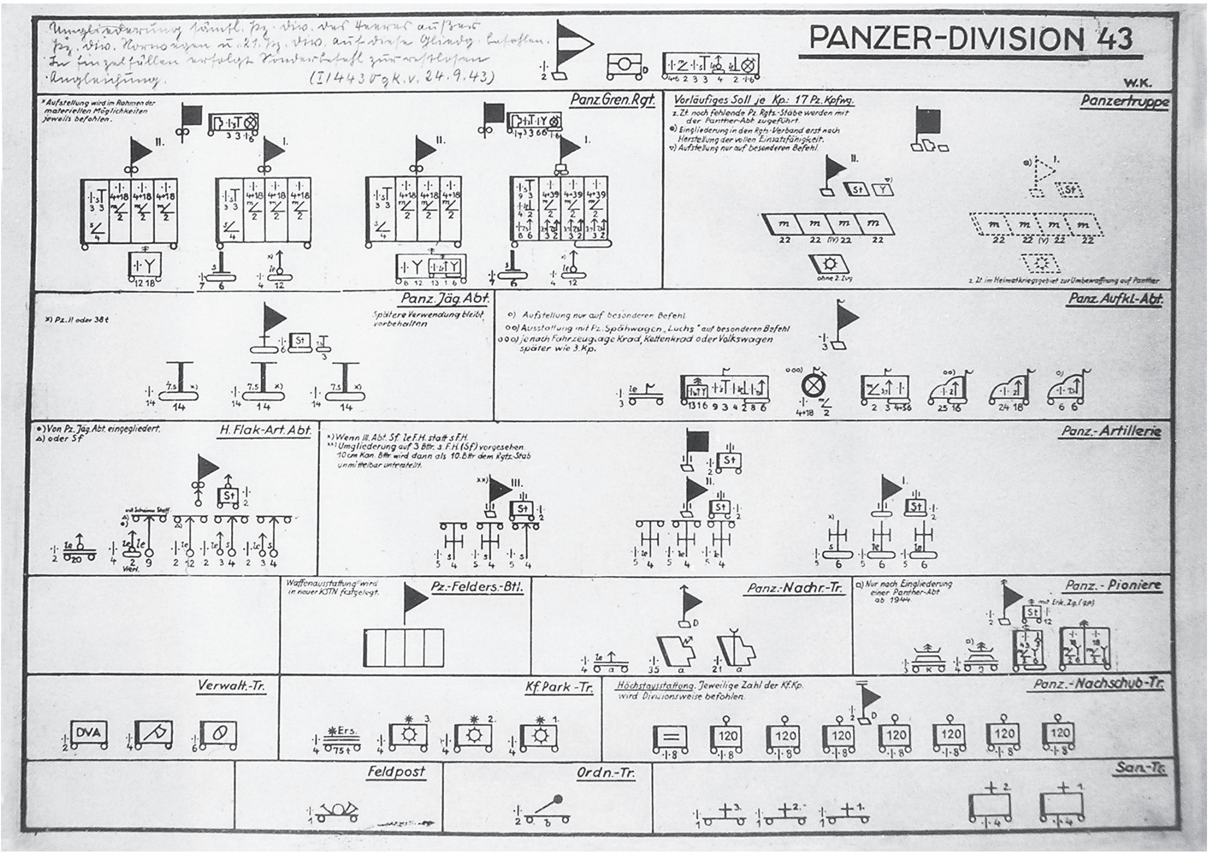
For Staff of the PzAbt	1107 dated 1 November 1941
For the Staff Kp with Kfz repairs staff	1150 dated 10 January 1943
For PzKp of PzAbt	1177 dated 10 January 1943
For a workshop platoon	1185 dated 10 January 1943

The requirement that PzAbt 51 would report as combat ready on 20 February 1943 was probably optimistic as their tanks had not been delivered. This optimism was caused by a demand from Hitler that all must be ready for the start of Operation Citadel in May. The new weapons, Panther and the Ferdinand heavy assault gun had to be available by that date without fail for the level of fighting to be expected.

The Panther was not available in increasing numbers until the spring of 1942. In September 1942, the GenInsp-PzTrp had estimated that 250 vehicles would be ready by 12 May 1943 in his list *Überblick Rüststand Heer* (Survey of the Armaments Situation [Army]). This target was almost met. By May some 200 tanks had been delivered to PzAbt 51 and PzAbt 52 (both attached to PzRgt 39).



This Panther Ausf D *Panzerbefehlswagen* (command vehicle) of 5.SS Panzer Division *Wiking* has the normal (but bent) 2m rod aerial mounted on the left-hand side behind the turret. The star- or Y- shaped aerial has been mounted on a porcelain insulator. (Anderson)

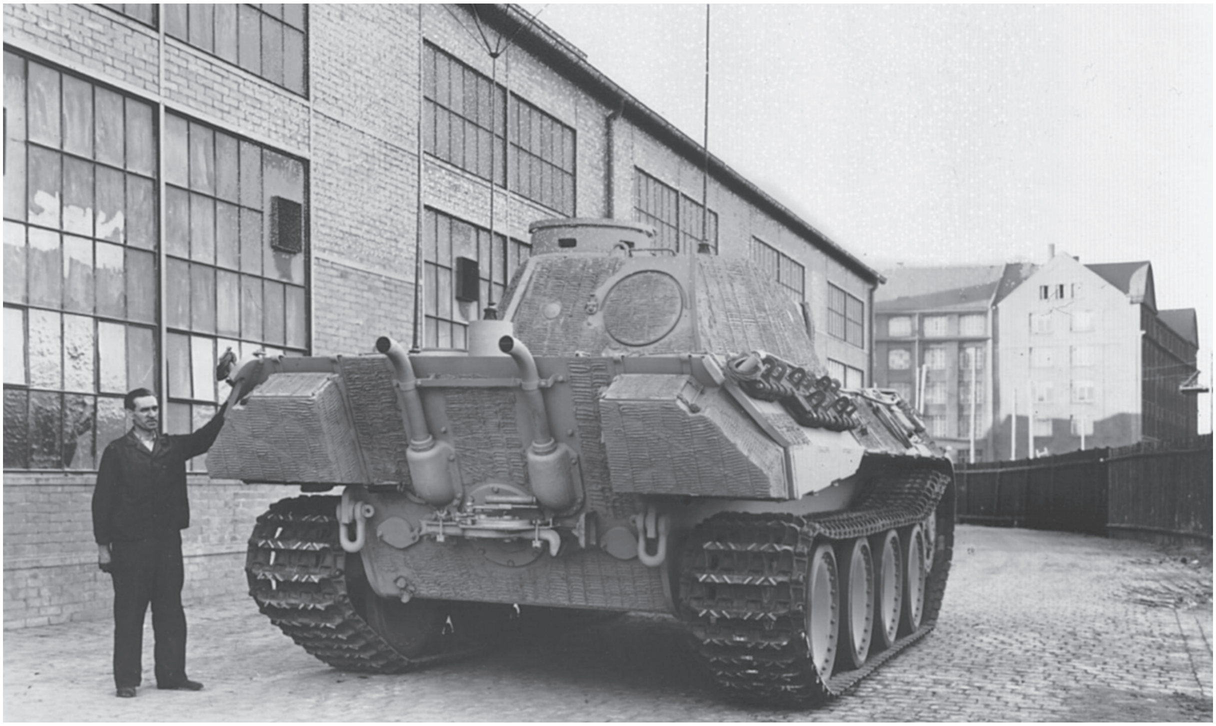

PANZER-DIVISION 43
W.K.
(I 1443 g K. v. 24.9.43)
Panz.Gren.Rgt.
Vorläufiges Soll je Kp.: 17 Pz. Kpfwg.
Panzertruppe
Panz.Jäg.Abt.
Panz.Aufkl.-Abt.
H.Flak-Art.Abt.
Panz.-Artillerie
Pz.-Felders.-Btl.
Panz.-Nachr.-Tr.
Panz.-Pioniere
Verwalt.-Tr.
Kf.Park-Tr.
Panz.-Nachschub-Tr.
Feldpost
Ordn.-Tr.
San.-Tr.
DVA
120

The structure of Panzerdivision 43 was based on availability. This later scheme shows 1. Abt (Panther) being deleted because the vehicles were not available. The self-propelled assault guns expected for the PzJgAbt were replaced with anti-tank guns (PaK).

Because the Panther was to replace the PzKpfw III and IV as the main battle tank in the long term, the old KStN 1175 *mittlere Panzer Kompanie* (m PzKp – medium tank company) dated 1 November 1941 was altered and a new organizational form (KStN 1177 Panther) created on 25 January 1943: this latter document has not been found in the archives. The number of tanks in a combat company was now 19 rather than 22: possibly the truth in view of the still small number of Panthers available.

It was planned from the outset to equip the Panzer divisions with one Panther battalion and one PzKpfw IV battalion, due to slow production of the new Panther.

In September 1943 the new model structure 'Panzerdivision 43' (PzDiv 43) came into force, and the Panzer divisions were gradually re-formed. This re-structuring sealed the integration of a Panzer regiment with two battalions to each four battle companies; also PzDiv 43 had a well-equipped Panzer-regimental staff. Besides a reconnaissance platoon they would have two radio control platoons and an armoured flame-thrower platoon at the commander's disposal. An separate workshop company would be attached to the two PzAbts. The structure also embraced the implementation of a *Panzerjäger* self-propelled assault gun battalion with four companies and a self-propelled artillery



Panzerbefehlswagen (command vehicles) were developed for regimental and battalion staffs, and were fitted with short-range Fu-5 (VHF), and long-range Fu-8 (MW) radio equipment. The latter used a *Sternantenne* (star aerial) D, as mounted on this Panther Ausf D. (Historyfacts)

battalion. However, it should be clear that this arrangement represented the ideal and would only rarely be fully implemented.

A later version of PzDiv 43 indicated two workshop companies, one for each PzAbt. Among many other changes the most important was that the *Panzerjäger Abteilung* was much reduced.

Staff and Staff Company of a PzAbt Panther

The staff company (which included the staff) was described in the KStN 1150a. The edition of 10 January 1943 is not available, so the tables overleaf are based on the November 1943 version.

The battalion commander led the unit and had at his disposal a cross-country vehicle and a number of motorcycles. He also had the use of an armoured command vehicle of the signals unit.

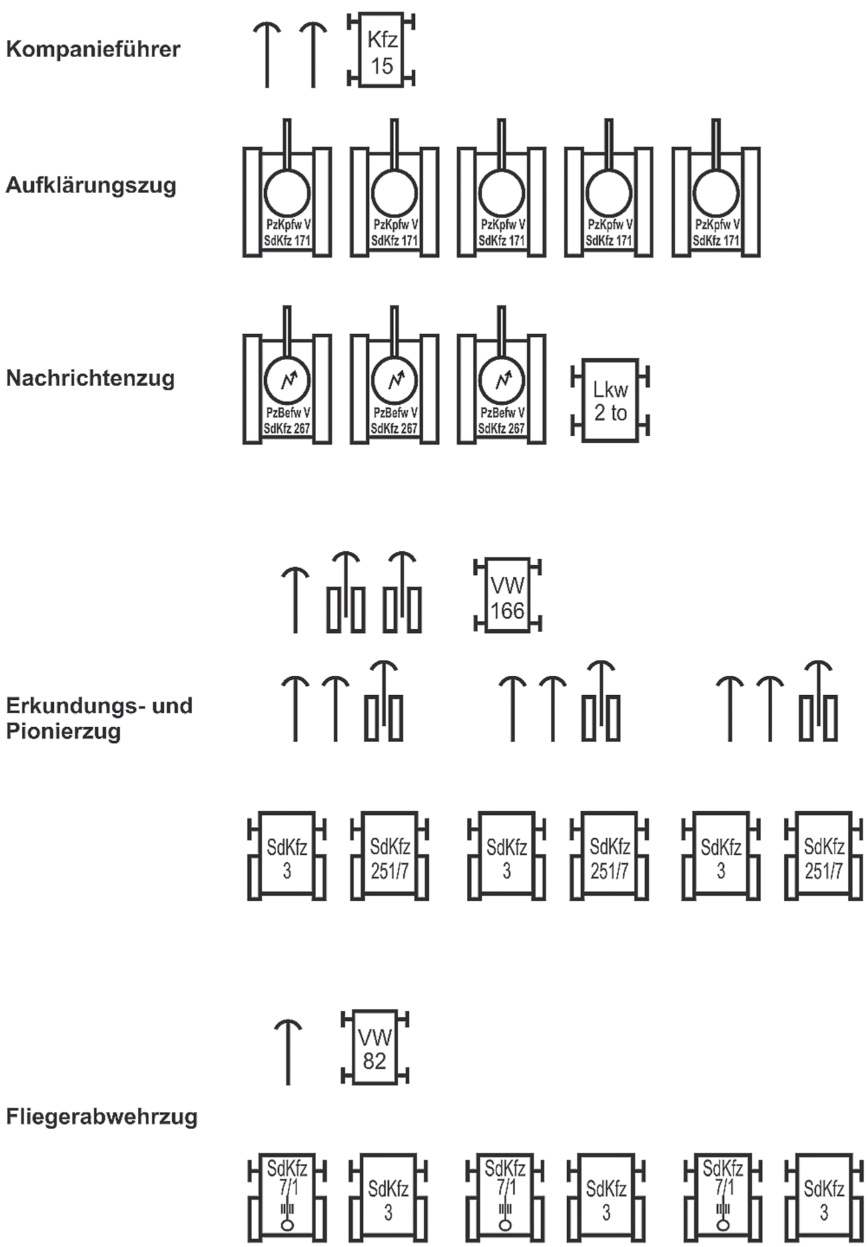
The reconnaissance platoon scouted across the battlefield area. It was equipped with five Panthers, to perform armed reconnaissance as there was always possibility of a serious exchange of fire. The platoon was also a battle reserve.

The signals platoon was equipped with three Panther armoured command vehicles. Its equipment had sufficient range for contacting neighbouring units, command echelons and distant supply groups.

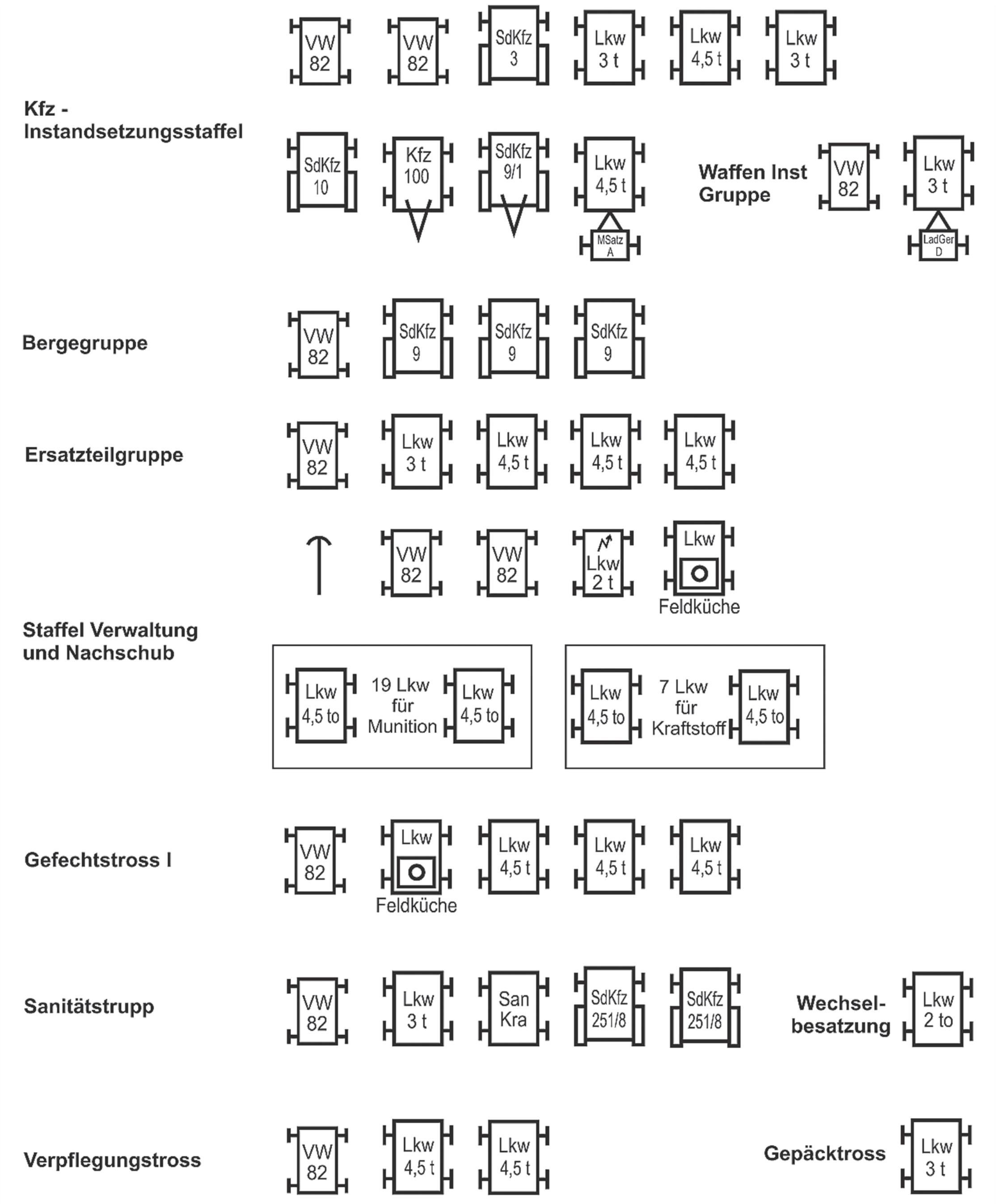
Both the close reconnaissance and pioneer platoon carried out important tasks within the PzAbt Panther. The former carried out its assignments with very versatile

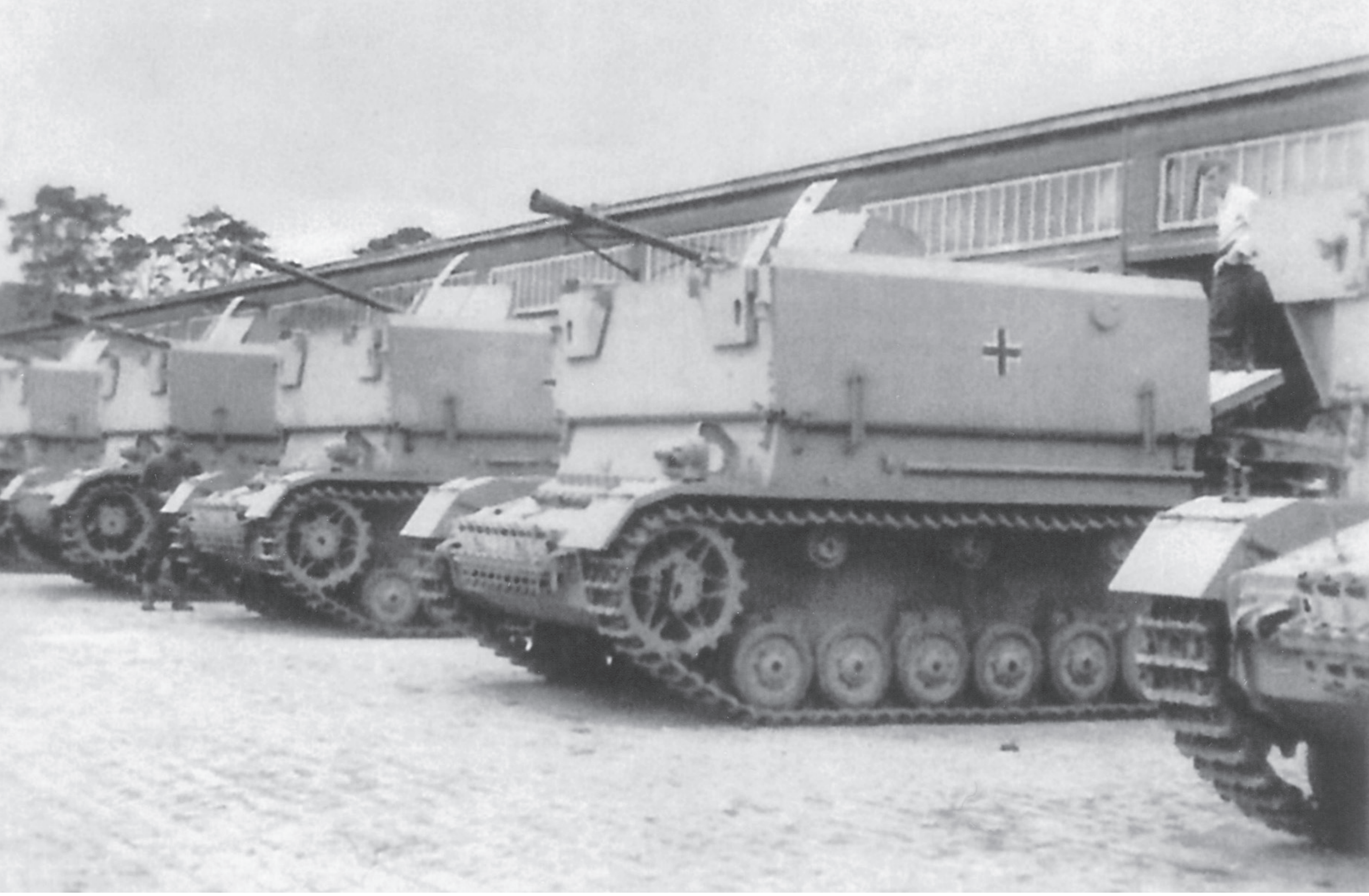
Staff Company of a Panzer *Abteilung* Panther

Table of organization according to KStN 1150a of 1 November 1943.


Kompanieführer
Kfz 15
Aufklärungszug
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
Nachrichtenzug
PzBefw V SdKfz 267
PzBefw V SdKfz 267
PzBefw V SdKfz 267
Lkw 2 to
VW 166
Erkundungs- und Pionierzug
SdKfz 3
SdKfz 251/7
SdKfz 3
SdKfz 251/7
SdKfz 3
SdKfz 251/7
VW 82
Fliegerabwehrzug
SdKfz 7/1
SdKfz 3
SdKfz 7/1
SdKfz 3
SdKfz 7/1
SdKfz 3

The staff company embraced a reconnaissance, signals, close reconnaissance and pioneer platoon and all necessary sections for supply and repair.


VW 82
VW 82
SdKfz 3
Lkw 3 t
Lkw 4,5 t
Lkw 3 t
Kfz - Instandsetzungsstaffel
SdKfz 10
Kfz 100
SdKfz 9/1
Lkw 4,5 t
MSatz A
Waffen Inst Gruppe
VW 82
Lkw 3 t
LadGer D
Bergegruppe
VW 82
SdKfz 9
SdKfz 9
SdKfz 9
Ersatzteilgruppe
VW 82
Lkw 3 t
Lkw 4,5 t
Lkw 4,5 t
Lkw 4,5 t
VW 82
VW 82
Lkw 2 t
Lkw
Feldküche
Staffel Verwaltung und Nachschub
Lkw 4,5 to
19 Lkw für Munition
Lkw 4,5 to
Lkw 4,5 to
7 Lkw für Kraftstoff
Lkw 4,5 to
Gefechtstross I
VW 82
Lkw
Feldküche
Lkw 4,5 t
Lkw 4,5 t
Lkw 4,5 t
Sanitätstrupp
VW 82
Lkw 3 t
San Kra
SdKfz 251/8
SdKfz 251/8
Wechsel-besatzung
Lkw 2 to
Verpflegungstross
VW 82
Lkw 4,5 t
Lkw 4,5 t
Gepäcktross
Lkw 3 t



From 1944, Panzer divisions were supplied increasingly with *Flakpanzers* for protection against low-level aircraft. These 3.7cm FlaK 43 *Möbelwagen* (Furniture Van) were photographed at Schwetzingen awaiting delivery. (Anderson)

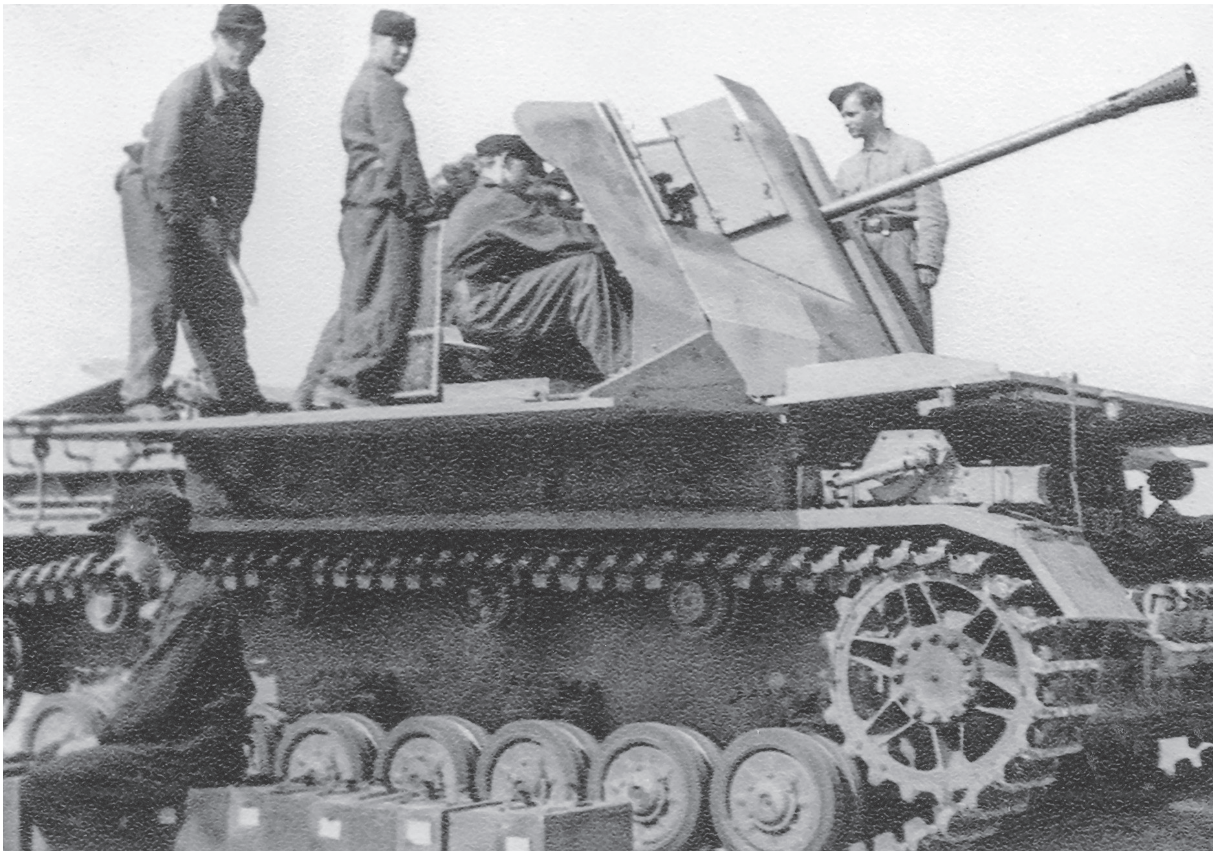
vehicles such as the VW *Schwimmwagen* (amphibious car) and NSU *Kettenkrad* (half-tracked motorcycle). The armoured pioneer platoon had three SdKfz 251/7 *Schützenpanzerwagen* (SPW – armoured half-track vehicles) and three 2t *Maultier* (Mule) half-track trucks to carry special tools and other equipment.

The actual equipping of the PzAbt Panther was dependent, to a large extent, on the supply situation. For example instead of the VW-*Kübelwagen* other types of cross-country vehicle could be issued. The *Maultier* cross-country truck was also used primarily for operations in the Soviet Union. For units operating in the west or southeast, these would be replaced by conventional 3t and 4.5t trucks.

A *Flugzeugabwehrkanone* (FlaK) platoon of the staff company had three medium half-track vehicles (SdKfz 7/1) each mounting a 2cm *Flakvierling* 38. Three *Maultier* trucks were used to carry ammunition an other supplies.

The repairs section carried out regular maintenance on all types of vehicle. Ideally the unit would have a vehicle (Kfz 100) with a 3-ton capacity rotatable crane, and an SdKfz 9/1 with 6-ton capacity swing crane for general repairs. For major repairs an additional workshop platoon or tank company would be brought up and seconded to the PzAbt.

The recovery group had the standard equipment, three SdKfz 9 towing tractors, issued to German tank forces. After early experience of recovering the



A 3.7cm *Flakpanzer Möbelwagen* with all of the side sections folded down as engineers carry out maintenance on the gun and mounting. (Anderson)

PzKpfw VI Tiger Ausf E, introduced in September 1942, it must have become obvious that three SdKfz 9 would also be required to haul an immobile Panther. Other more efficient recovery tractors were under development, but would not be available for the beginning of Operation Citadel.

The *Sanitätstruppe* (medical troop) was equipped with a cross-country car, a truck, a medical van and two SdKfz 251/8 *Krankenpanzerwagen* (armoured half-track ambulance).

The remaining elements, especially the supply units, had trucks for all purposes.

Medium Company Panther

At the time when the first two units (PzAbt 51 and 52/PzRgt 39) were formed, the valid documents were the KStN 1177 of 10 January 1943. The new *mittlere Panzer-Kompanie* (m PzKp – medium tank company) Panther had three Panthers in the company troop and four companies each with four Panthers; a total of 19 tanks. Four months later, when the attack on the Kursk Elbow began, PzAbt 51 and 52 had over 96 Panthers according to the KStN, each company having 22 such vehicles and the battalion staff another eight, which the KStN of November 1943 effectively anticipated.

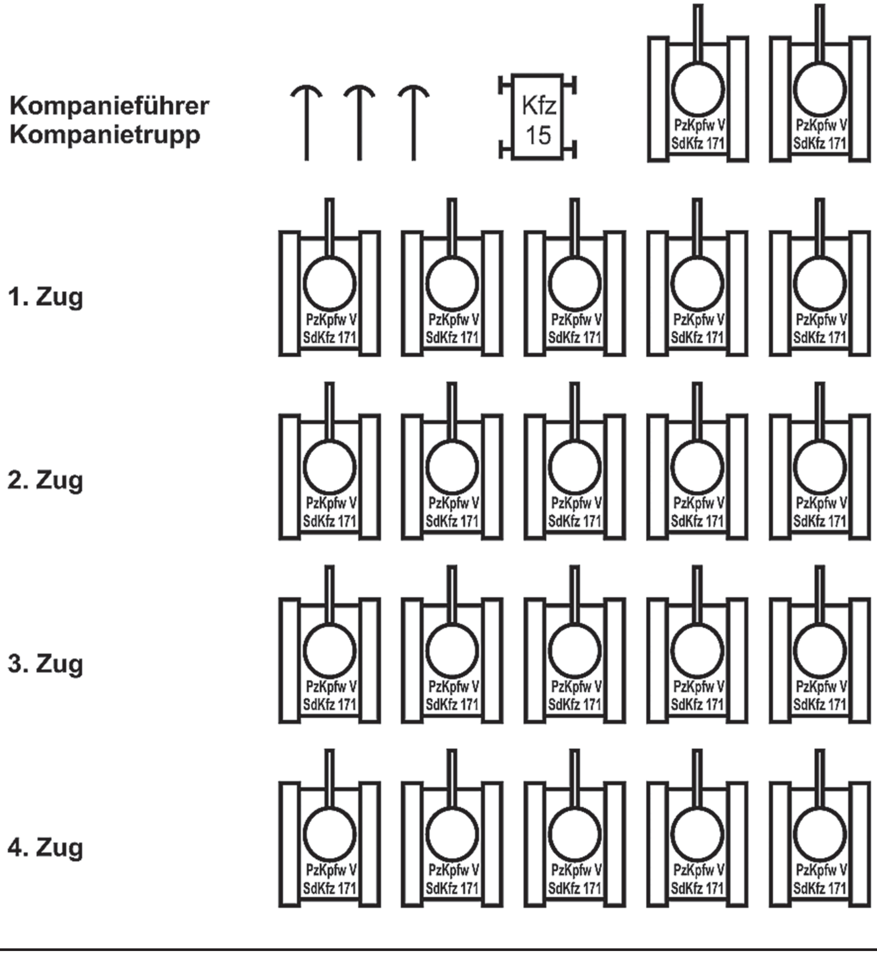
Workshop platoon and workshop company (PzWerkstKp)

In order to keep vehicles and tanks operational, it became essential to establish more repairs units. In November 1943, a new variant of the PzWerkstKp was introduced and based on the newly introduced 'PzDiv43'. The company had two light workshop platoons (for PzKpfw IV) and one for Tigers and Panthers.

In principle the equipping of this unit remained the same over the years, but there were some adjustments with regard to the greater weights of the new tanks. Thus the introduction of the heavy PzKpfw VI Tiger Ausf E and later the Panther necessitated more efficient lifting gear. Other than

Medium Panzer Company Panther

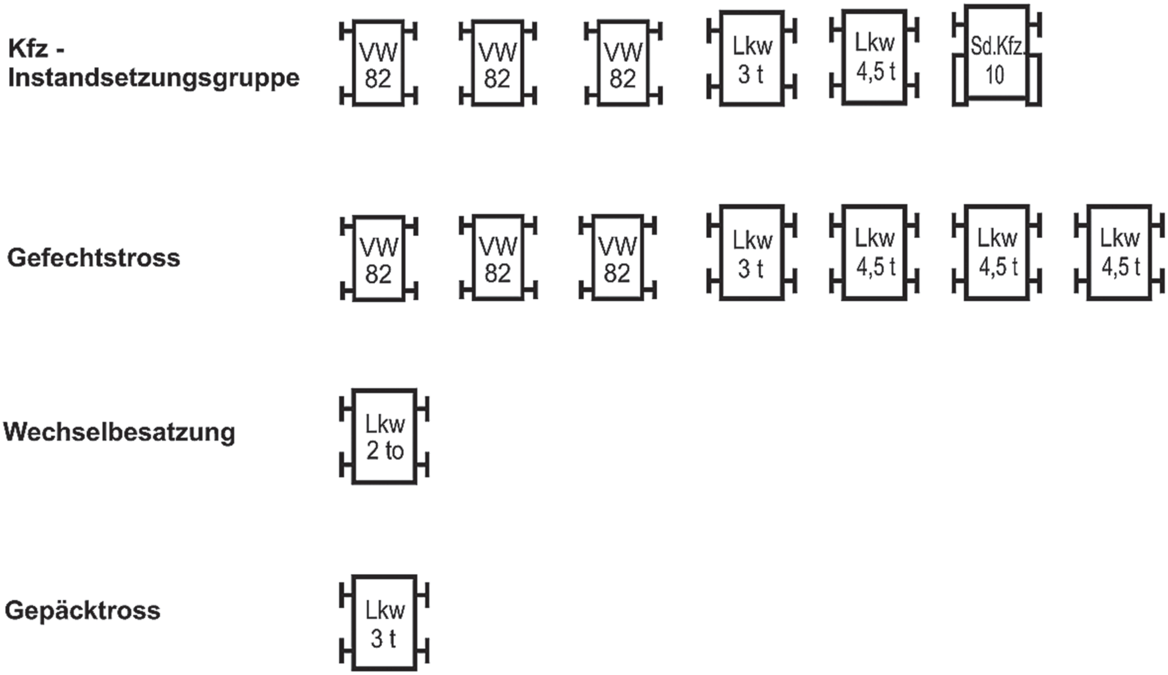
Table of organization according to KStN 1177 of 1 November 1943.


Kompanieführer
Kompanietrupp
Kfz 15
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
1. Zug
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
2. Zug
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
3. Zug
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
4. Zug
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171
PzKpfw V SdKfz 171

a 3-ton capacity swing crane on a 4.5t truck (Kfz 100) and the 6-ton capacity swing crane on a SdKfz 9/1, a 16t portal crane was used for lifting off the turrets of the modern tanks. There were also ten swing cranes on SdKfz 10/2 available. Interestingly, according to KStN no heavy recovery vehicles were planned.

The October 1943 issue of *Nachtrichteblatt der Panzertruppen* recorded:

> Repair services with Panther battalions.
> Ideal for each battalion: One tank workshop platoon
> One repair section at staff company
> One repair group for each Panther company

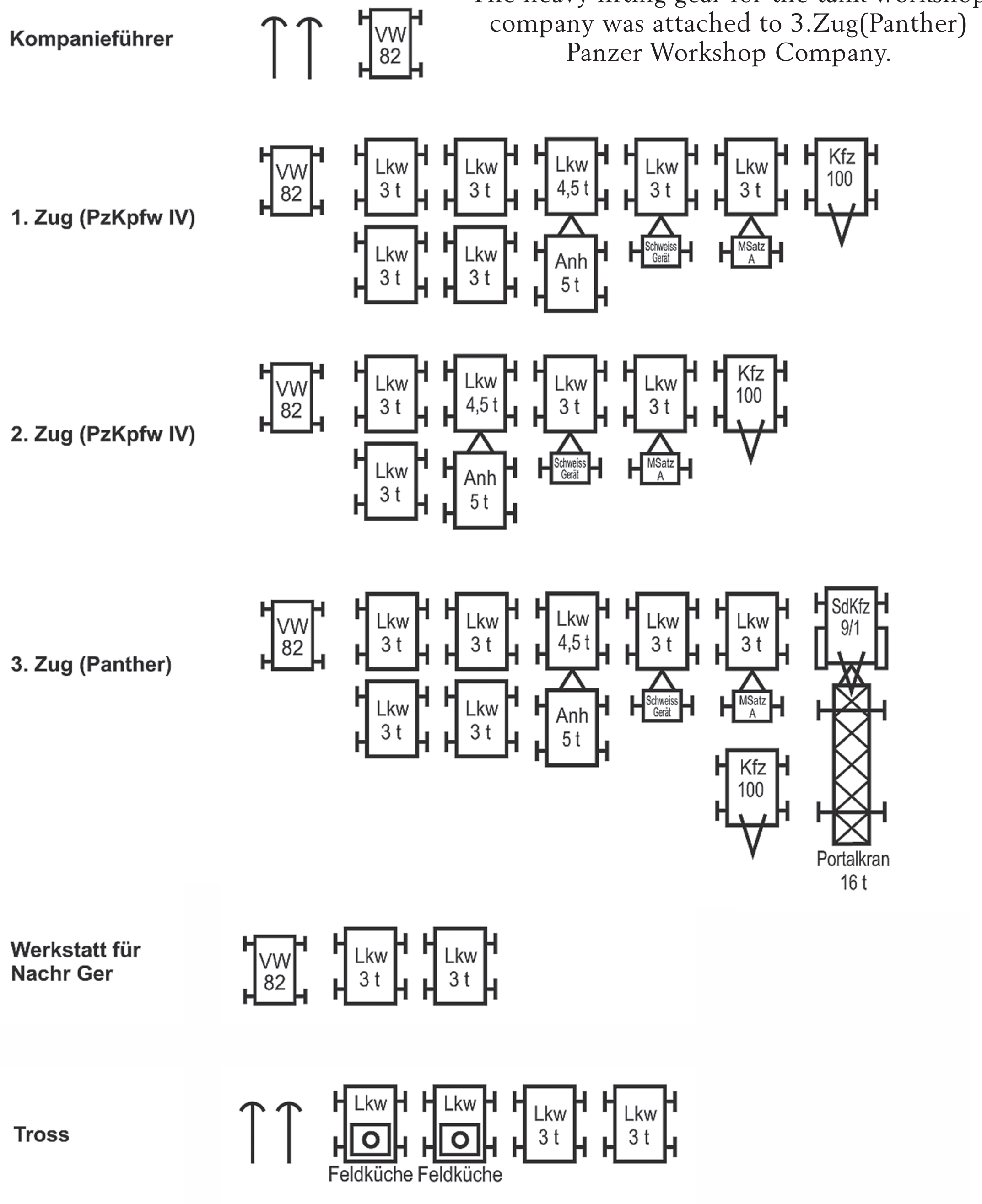

Kfz - Instandsetzungsgruppe
VW 82
VW 82
VW 82
Lkw 3 t
Lkw 4,5 t
Sd.Kfz. 10
Gefechtstross
VW 82
VW 82
VW 82
Lkw 3 t
Lkw 4,5 t
Lkw 4,5 t
Lkw 4,5 t
Wechselbesatzung
Lkw 2 to
Gepäcktross
Lkw 3 t

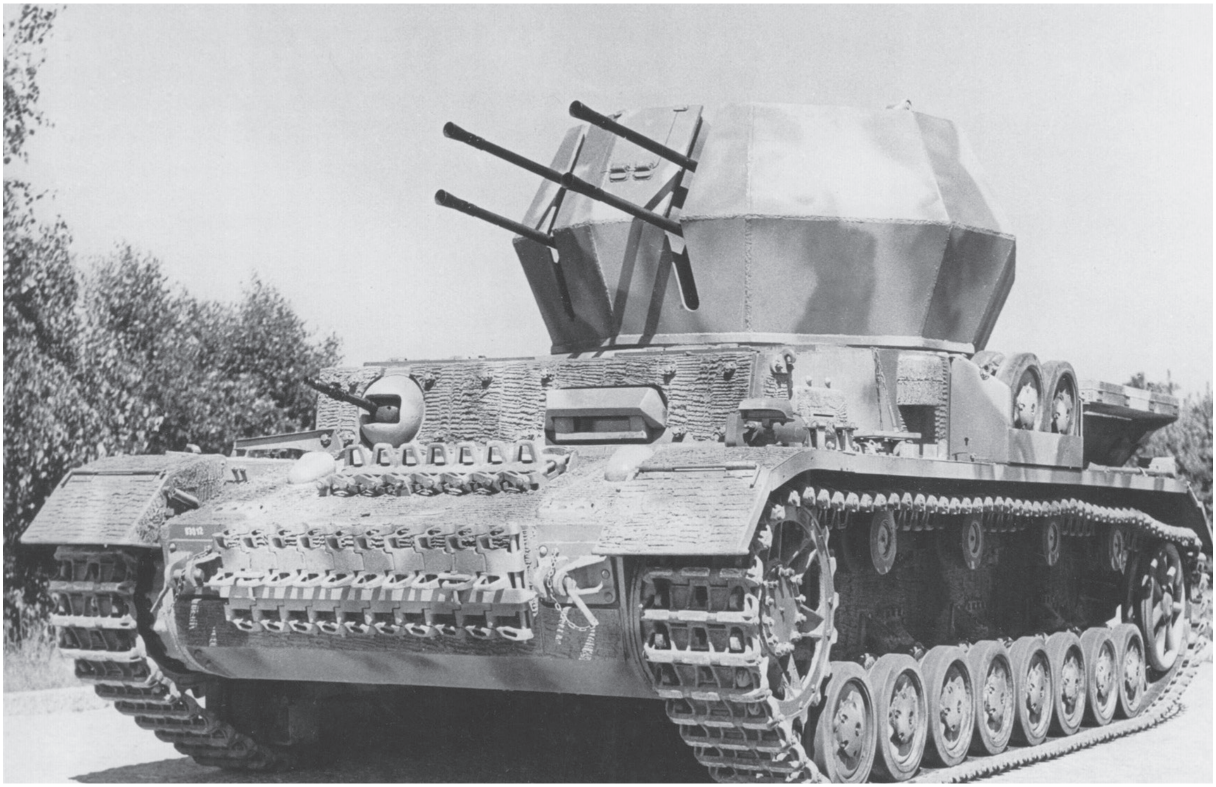
During the first engagement in the Kursk Elbow, the companies in PzAbt 51 and 55 had an effective fighting strength of over 22 tanks.

Panzer Workshop Company

Table of organization according to KStN 1154 of 1 November 1943.

The heavy lifting gear for the tank workshop company was attached to 3.Zug(Panther) Panzer Workshop Company.


Kompanieführer
VW 82
1. Zug (PzKpfw IV)
VW 82
Lkw 3 t
Lkw 3 t
Lkw 4,5 t
Lkw 3 t
Lkw 3 t
Kfz 100
Lkw 3 t
Lkw 3 t
Anh 5 t
Schweiss Gerät
MSatz A
2. Zug (PzKpfw IV)
VW 82
Lkw 3 t
Lkw 4,5 t
Lkw 3 t
Lkw 3 t
Kfz 100
Lkw 3 t
Anh 5 t
Schweiss Gerät
MSatz A
3. Zug (Panther)
VW 82
Lkw 3 t
Lkw 3 t
Lkw 4,5 t
Lkw 3 t
Lkw 3 t
SdKfz 9/1
Lkw 3 t
Lkw 3 t
Anh 5 t
Schweiss Gerät
MSatz A
Kfz 100
Portalkran 16 t
Werkstatt für Nachr Ger
VW 82
Lkw 3 t
Lkw 3 t
Tross
Lkw
Lkw
Lkw 3 t
Lkw 3 t
Feldküche
Feldküche



The *Flakpanzer* IV (SdKfz 161/4) *Wirbelwind* (Whirlwind) had a semi-enclosed, lightly armoured rotating turret. The 2cm *Flakvierling* 38 was a very effective gun, short bursts of tracer were often sufficient to drive off low-flying aircraft. (Historyfacts)

Purpose of the newly introduced repairs section is:
1.) To relieve the repairs groups so that they can swiftly follow their units.
2.) To work on medium to serious damage before the tank workshop platoon arrives.
3.) To repair minor damage on the tanks and wheeled vehicles of the staff company.

The instruction manual for the repairs service at tank units issued by the tank troop regulatory authority provides closer details in regard to structure, tasks, leaders, operations and the equipping of the repairs services.

Lifting equipment:	
At repairs staff	One 3t swing crane on 4.5t truck (Kfz 100) One 6t swing crane on 18t s ZgKw (SdKfz 9/1)
At workshop platoon	One 3t swing crane on 4.5t truck (Kfz 100) One 6t swing crane on 18t s ZgKw (SdKfz 9/1) One 10t swing crane on 18t ZgKw (SdKfz 9/2) At the moment SdKfz 9/1 are still being delivered One 16t portal crane and trailer

There is also a swing crane being developed for lifting the turret of a Panther. This crane (load 2t) can also be used for Tiger and assault gun.

> Recovery vehicles:
>
> | | |
> |---|---|
> | At repairs staff | Three s ZgKw 18t |
> | At workshop platoon | Five s ZgKw 18t |
>
> In place of three s ZgKw 18t, two ZgKw 35t (recovery vehicle on a Panther chassis) have been ordered, but at present have not performed to requirements. The towing of a Panther generally requires two s ZgKw 18t and "strong towing bars" are required (also suitable for Tiger). Changes to the chassis cross members on the ZgKw for fitting the tow bars have to be carried out first. A Panther may only tow another Panther if it is immobile in terrain receiving enemy fire. Reasons: The final-drive units and gearbox become overstressed. The tracks are inferior, sinking too easily on soft ground, to those on the ZgKw which has rubber pads which give better traction.

These observations prove that the supply to the fighting companies or repair and recovery units had not been fully regulated. A distribution of Panther recovery vehicles to workshop platoons or companies cannot be substantiated

In 1944, this would have been the ideal situation for a modern tank unit: Panthers make their advance against the enemy with their flanks protected by battle-ready 3.7cm FlaK 43 *Möbelwagen*. (Anderson)

from existing KStN. They have their first mention in the 'Structure of the Supply Company' dated 1 November 1944. In the meantime all necessary resources were distributed through command channels.

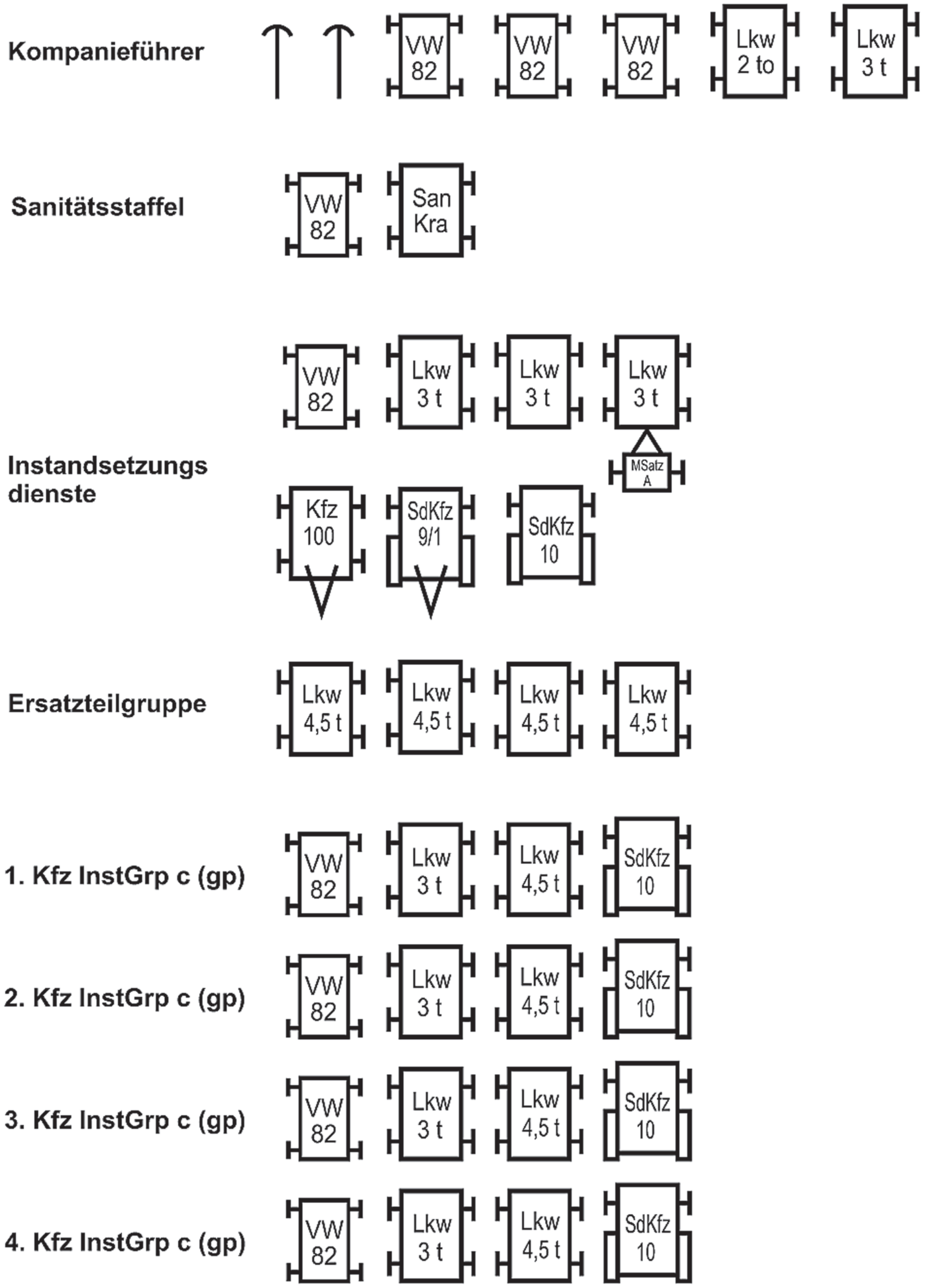
Supply Company

With the introduction of the *freie Gliederung* (see below), the staff company of PzAbt Panther and the workshop company had only rudimentary recovery services available, and even the space for transporting ammunition and fuel was was severely restricted. These lacking services were now grouped together in a *Versorgungskompanie* (VersKp – supply company). KStN 1151 (VersKp-fG) was drawn up as the standarized supply company in various versions in order to meet requirements of the PzAbt equipped with the PzKpfw IV and Panther.

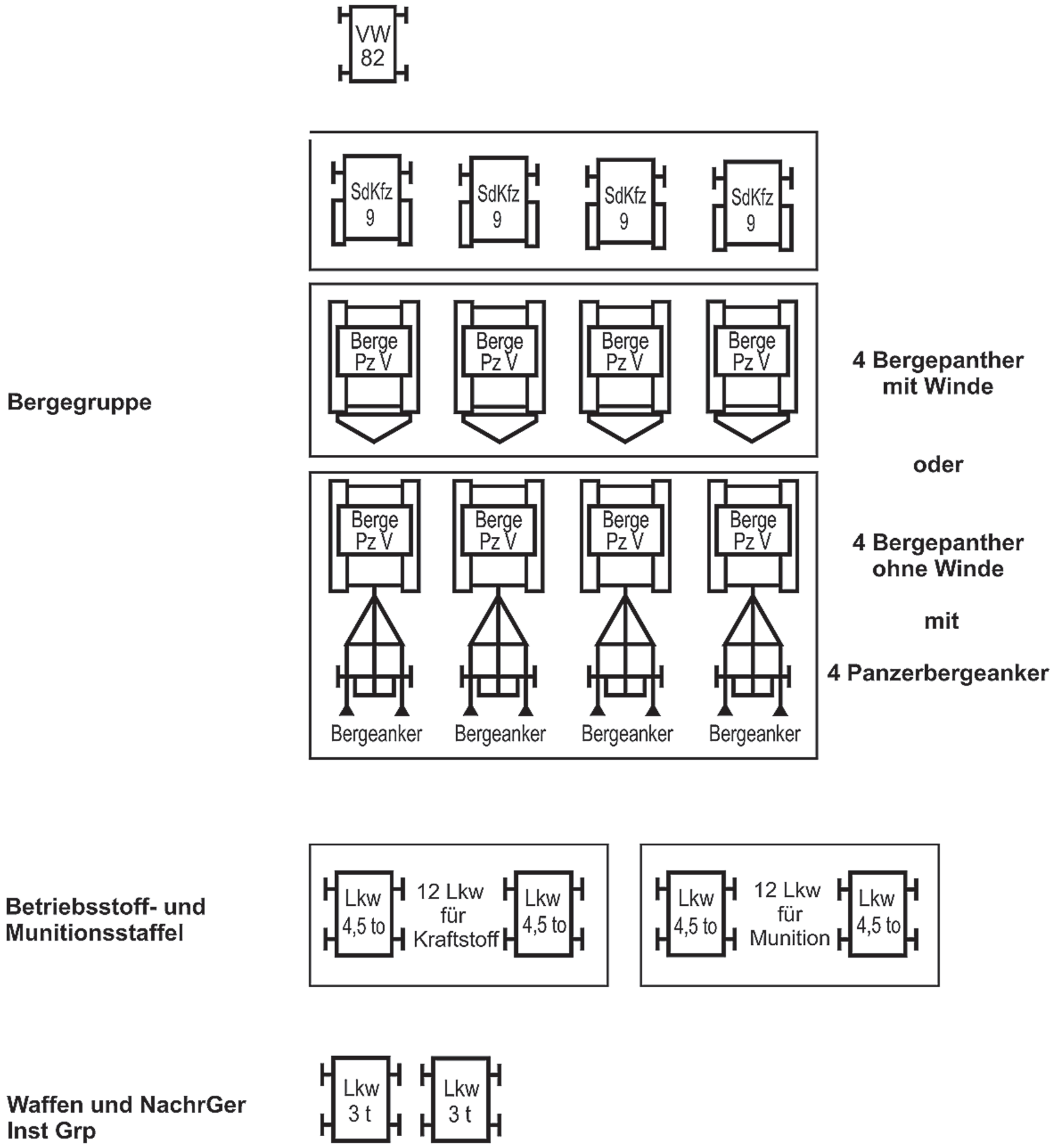
The KStN 1151 Ausf C predicted the need for 24 heavy trucks to carry fuel and ammunition for a battalion with 17 Panthers in each fighting company.

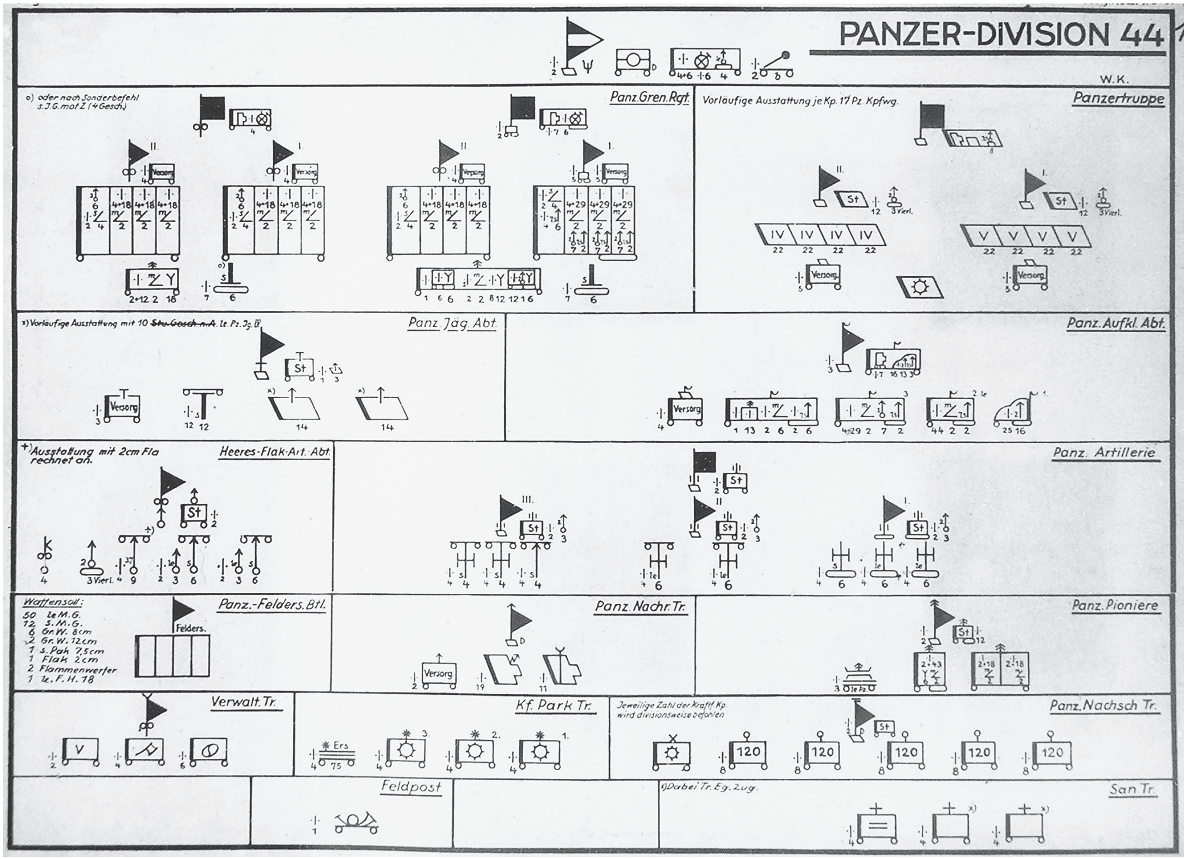
Verorgungskompanie (fG) PzAbt IV and PzAbt Panther

Table of organization according to KStN 1151 of 1 November 1943.


Kompanieführer
VW 82
VW 82
VW 82
Lkw 2 to
Lkw 3 t
Sanitätsstaffel
VW 82
San Kra
Instandsetzungs dienste
VW 82
Lkw 3 t
Lkw 3 t
Lkw 3 t
MSatz A
Kfz 100
SdKfz 9/1
SdKfz 10
Ersatzteilgruppe
Lkw 4,5 t
Lkw 4,5 t
Lkw 4,5 t
Lkw 4,5 t
1. Kfz InstGrp c (gp)
VW 82
Lkw 3 t
Lkw 4,5 t
SdKfz 10
2. Kfz InstGrp c (gp)
VW 82
Lkw 3 t
Lkw 4,5 t
SdKfz 10
3. Kfz InstGrp c (gp)
VW 82
Lkw 3 t
Lkw 4,5 t
SdKfz 10
4. Kfz InstGrp c (gp)
VW 82
Lkw 3 t
Lkw 4,5 t
SdKfz 10

With the introduction of the *freie Gliederung*, a supply company was added.


VW 82
SdKfz 9
SdKfz 9
SdKfz 9
SdKfz 9
Bergegruppe
Berge Pz V
Berge Pz V
Berge Pz V
Berge Pz V
4 Bergepanther mit Winde
oder
Berge Pz V
Berge Pz V
Berge Pz V
Berge Pz V
4 Bergepanther ohne Winde
mit
4 Panzerbergeanker
Bergeanker
Bergeanker
Bergeanker
Bergeanker
Betriebsstoff- und Munitionsstaffel
Lkw 4,5 to
12 Lkw für Kraftstoff
Lkw 4,5 to
Lkw 4,5 to
12 Lkw für Munition
Lkw 4,5 to
Waffen und NachrGer Inst Grp
Lkw 3 t
Lkw 3 t


PANZER-DIVISION 44
W.K.
o) oder nach Sonderbefehl s.J.G. mot Z (4 Gesch.)
Panz.Gren.Rgt.
Vorläufige Ausstattung je Kp. 17 Pz. Kpfwg.
Panzertruppe
Versorg
St
x) Vorläufige Ausstattung mit 10 ~~Stu.Gesch.n.A.~~ le. Pz.Jg. IV
Panz.Jäg.Abt.
Panz.Aufkl.Abt.
+) Ausstattung mit 2cm Fla rechnet an.
Heeres-Flak-Art.Abt.
Panz. Artillerie
Waffensoll:
50 le.M.G.
12 s.M.G.
6 Gr.W. 8cm
2 Gr.W. 12cm
1 s.Pak 7,5cm
1 Flak 2cm
2 Flammenwerfer
1 le.F.H.18
Panz.-Felders.Btl.
Felders.
Panz.Nachr.Tr.
Panz.Pioniere
Verwalt.Tr.
Kf.Park Tr.
Ers
Jeweilige Zahl der Kraftf.Kp. wird divisionsweise befohlen
Panz.Nachsch.Tr.
120
Feldpost
1) Dabei Tr.Eg.Zug.
San.Tr.

The new organizational structure 'Panzerdivision 44' was introduced in 1944. (NARA)

Four mobile repair groups with half-track towing tractors could also carry out repairs in the field.

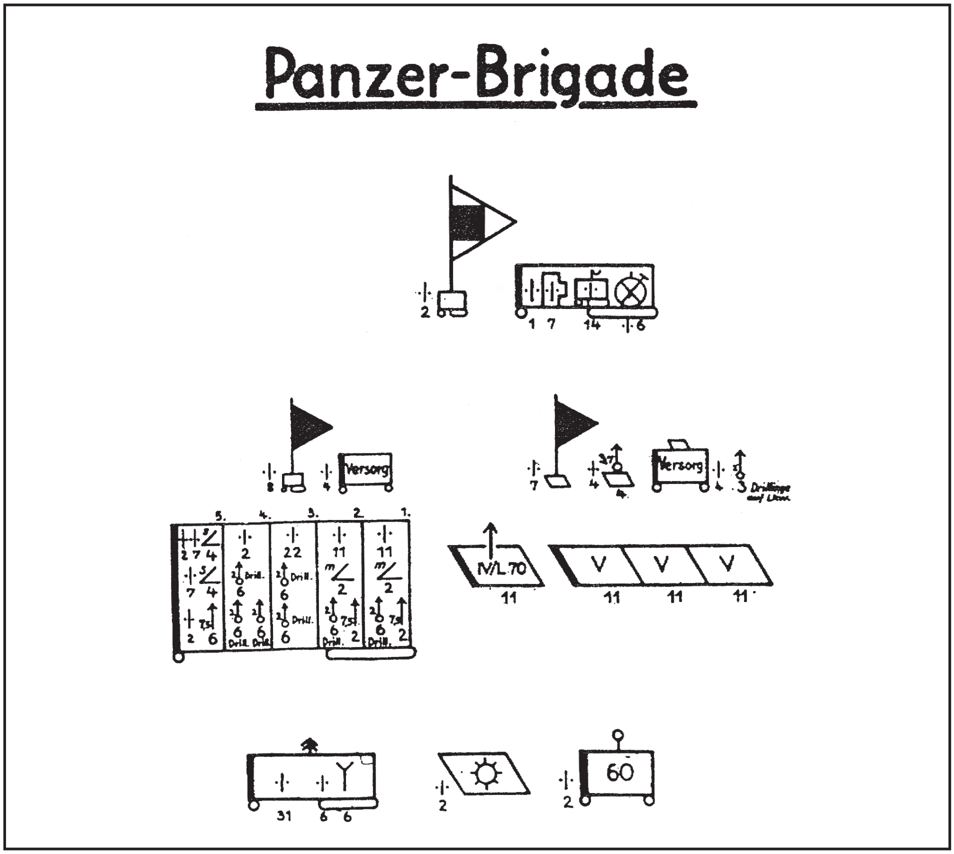
The recovery group had four SdKfz 9s and four *Bergepanther* recovery vehicles. But because not all of these were fitted with the 40-ton capacity winch, new Panthers were delivered with a tank recovery anchor.

freie Gliederung

In June 1944, a new organizational structure, *freie Gliederung* (fG) was introduced. In a recommendation for promotion dated 1 March 1944, the character of the 'inventor', *Oberstleutnant* Freyer was commented on:

> Very mature, spotless character… a dedicated National Socialist in word and deed… he has led the organizational department at the Inspector-General of Tank forces positively. The *freie Gliederung* is his initiative. Freyer has made decisive savings for the *Panzerwaffe*, which by virtue of their completely new, revolutionary nature have also been recommended to the other services.

One reason for the introduction of *freie Gliederung* together with changes based



The Panzer brigades were intended to react faster than a much larger Panzer division. (NARA)

on regular analysis of reports from front-line forces, was certainly the desire to trim down into smaller units. Undoubtedly in that way personnel and materials could be spared without having to the rely on the poor supply situation.

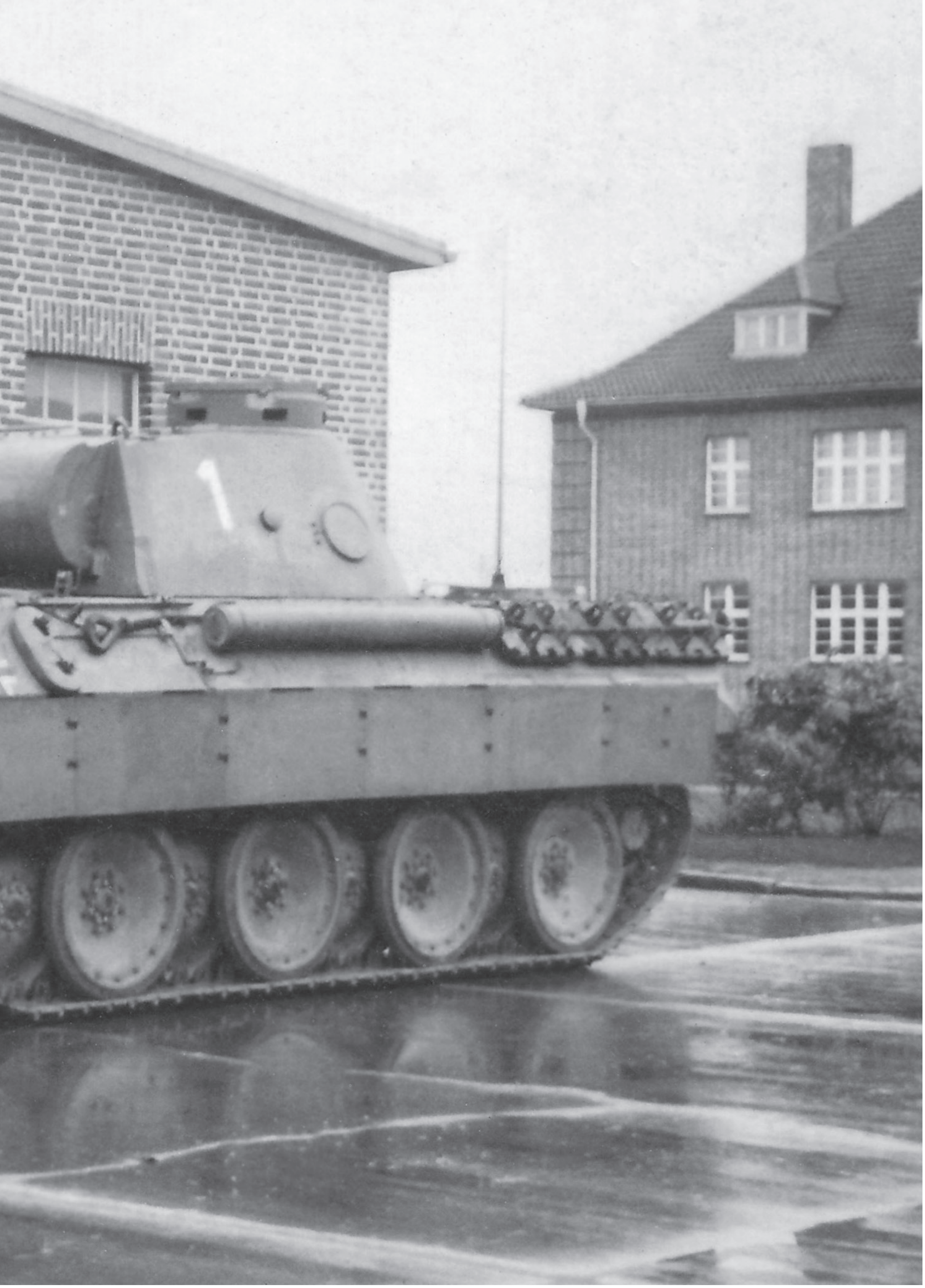
Nachtrichtenblatt der Panzertruppen of February 1945 noted:

> … based on troop experiences, and with a view to adapting to the personnel and materials situation, all KStN *freie Gliederung* for Panzer and Panzer-Grenadier divisions as well as Army *Abteilungen* were worked upon afresh and newly distributed on 1 November 1944.

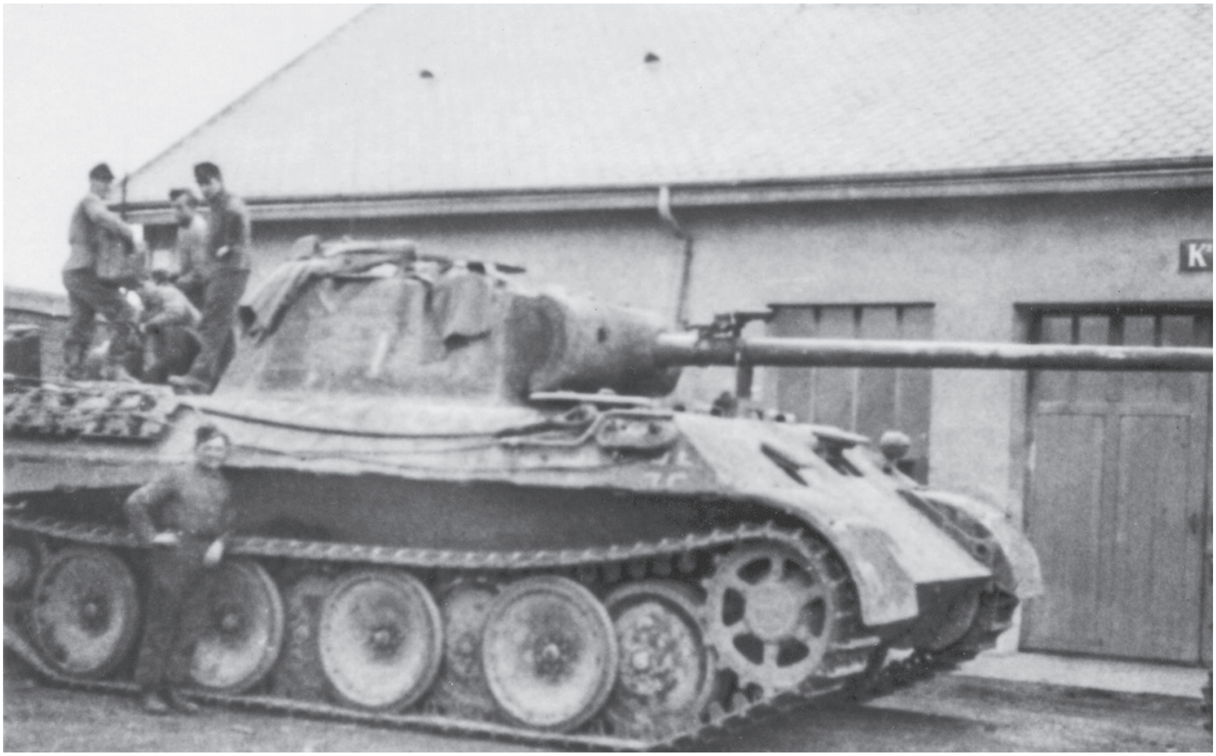
Adjusting the Strength of Fighting Companies

The KStN relevant to the Panther units was transposed into a *freie Gliederung*. In the course of introducing the fG, a flexible interpretation was agreed in 1944. The reasons probably lay in the increasingly varied requirements of front-line troops. It could now cover all requirements using limited resources.

The new KStN 1177 also contained the PzKpfw IV, Panthers and the new Pz IV/70. There were various iterations available, either with ten, 14 or 17 tanks. The number of non-armoured vehicles was adjusted accordingly.



A Panther Ausf D from a training unit at Erlangen. On the side of the turret there is a port for *Maschinenpistole* 40 (MP – machine pistol) and a communications hatch, which together the distinctively high commander's cupola, indentify this as an Ausf D. (Anderson)



An early PzKpfw V Panther Ausf D at the Mailly-le-Camp training depot has an interesting detail: a pyrotechnics simulator mounted on the gun barrel, possibly fitted by the troops. (Anderson)

PzDiv 44

From August 1944, a new basic structure ‘Panzerdivision 1944’ (PzDiv 44) was introduced. All secondary units were now switched to the *freie Gliederung*. The PzAbt, each still equipped with equal numbers of PzKpfw IV and Panthers, were now given a supply company each. While the staff companies of the two PzAbt each received three SdKfz 7/1 (2cm *Flakvierling* 38), the regimental staff was allocated a *Flakpanzer Zug* (anti-aircraft tank platoon) with eight vehicles: four 3.7cm Flakvieling 43 *Möbelwagen* (Furniture Van) and four 2cm *Flakvierling* 38 *Wirbelwind* (Whirlwind). However, equipping Panzer divisions depended on availability.

Army Panzer Brigades

Before World War II, consideration had been given to replacing the Panzer division with a smaller formation. A Panzer brigade would be established as the largest independent tank force. This idea was soon thrown out and preference given to the Panzer division with its efficient support elements.

In July 1944, Hitler demanded the renewed introduction of Panzer brigades. In view of the critical situation on all fronts, he wanted compact units which could be deployed more flexibly than a conventional Panzer division.

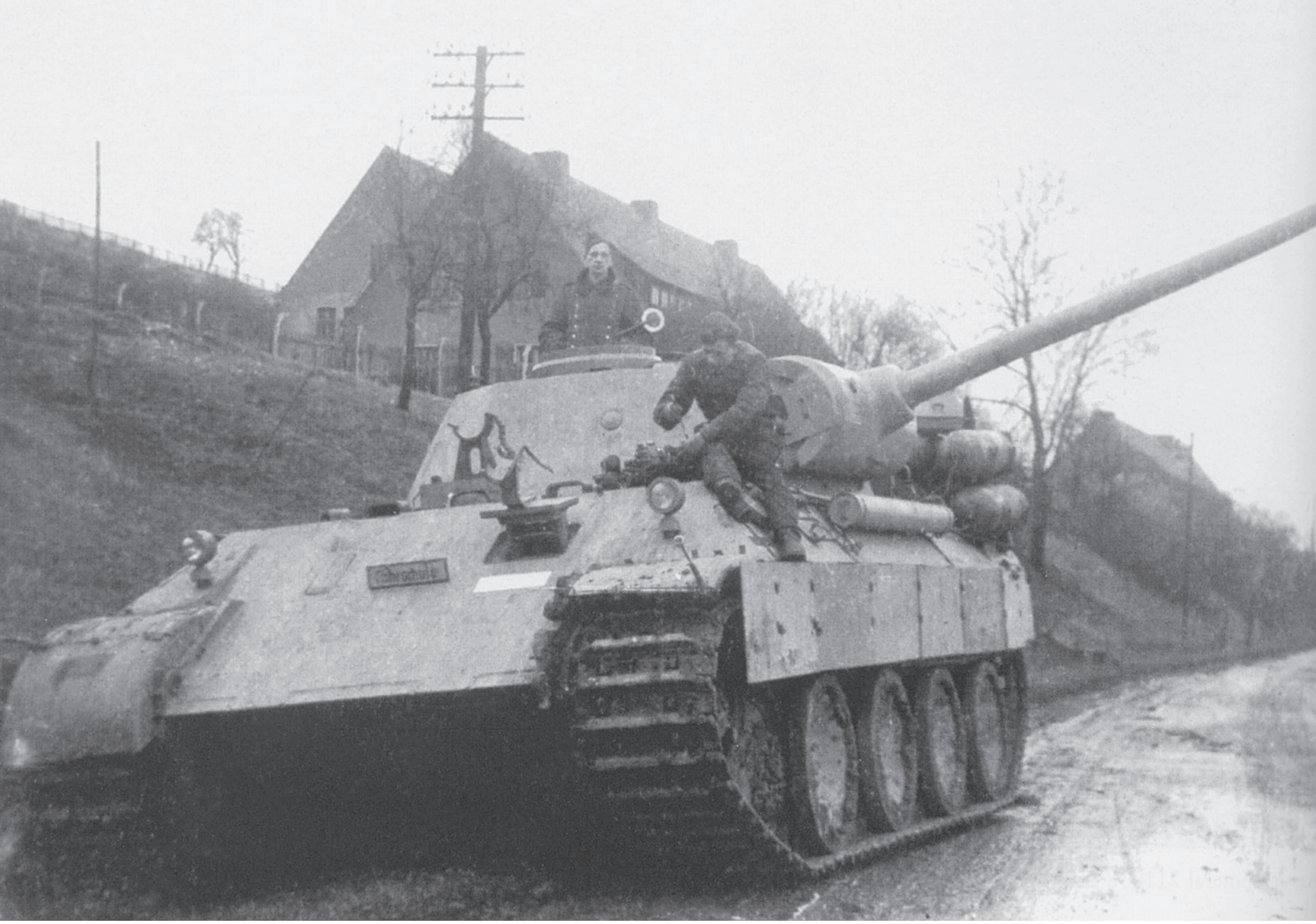
The training units received only a few Panthers, certainly not enough for prospective drivers to receive sufficient training. Also a severe shortage of fuel forced training units to use bottled gas. The aerial mounting on the turret roof indentifies this as a *Panzerbefehlswagen* (command tank). (Anderson)

The brigades would be moved about more rapidly and could be used for surprise attacks against massed enemy armour. This offensive aspect apparently appealed to Hitler, although to what extent the poor tank supply situation affected his plans is not known.

Beginning in July 1944, ten Panzer brigades (PzBrig 101 to 110) along with the *Führer-Begleit-Brigade* (FBB – Führer Escort Brigade) and the Panzer Brigade 106 *Feldherrnhalle* (PzBrig 106 FHH) were formed. According to KStN 1177 (fG) these had three Panzer companies each with eleven Panthers and a company of Pz IV/70 (SdKfz 162) *Jagdpanzers*. Staff companies received three Panthers and an additional four *Flakpanzers*.

In September 1944 the Inspector-General of Panzer Troops issued a supplement on the deployment of the Panzer Brigades:

> III. What is the PzBrig suitable for?
> Task: In mobile warfare to destroy the enemy by counterthrust or counterattack, i.e. the planned attack with limited aim. The strength of the Panzer brigade lies in its mobility, firepower and armour. The decisive precondition for success is the directed surprise attack by the entire brigade in close formation.
>
> IV. For what is the PzBrig not suitable?
> The Panzer brigade must not be deployed divided up or dispersed … in particular it is not to be split up to defend a sector protecting an operation by the PzGren battalion.



The gas cylinders were carried on the rear of a Panther racked in threes. When new tanks were run in at the factory they were fuelled by bottled gas. (Anderson)

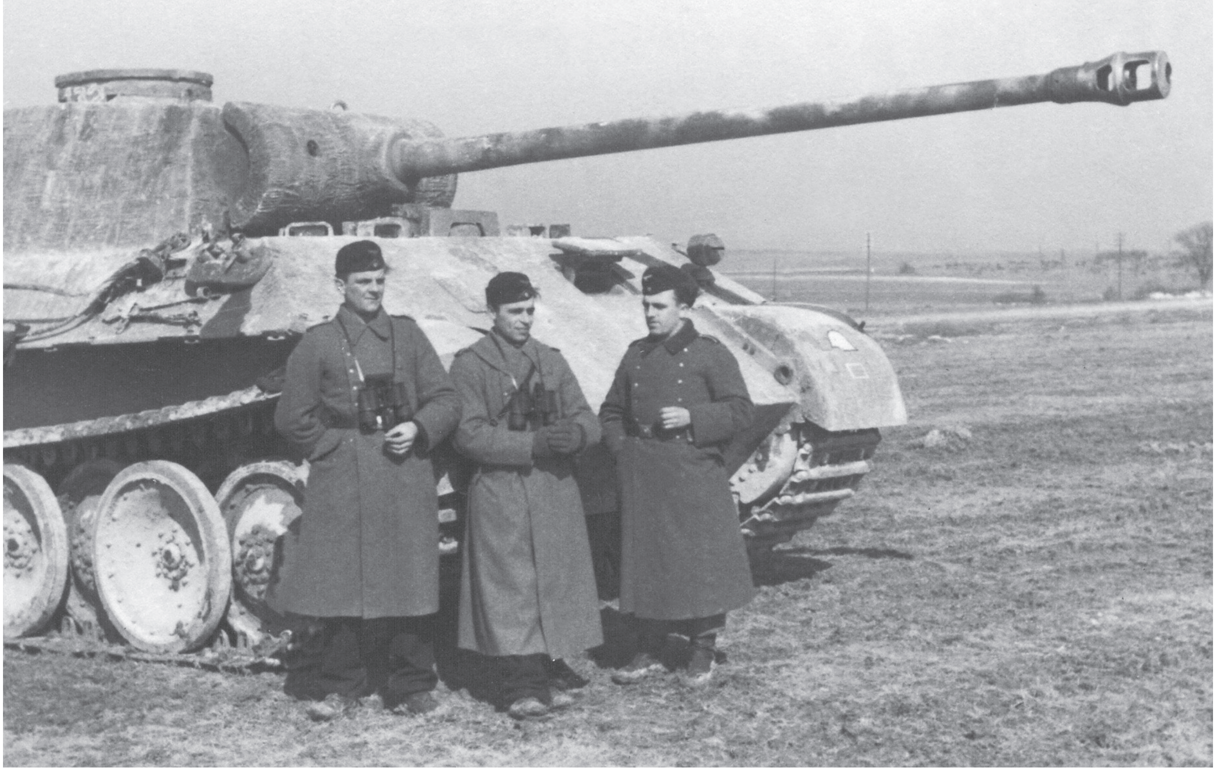
Shortly after being formed the Panzer brigades were dissolved. By November, officers, men and equipment were being re-integrated into regular Panzer divisions. One reason for this may have been that German tank troops in the summer and autumn of 1944 were forced to be defensive and more cautious during combat both in the west and the east.

Training at Erlangen

At the beginning of 1943 orders were issued to build a training organization for the Panther and Erlangen was chosen. Its proximity to the manufacturer MAN and the troop training depot at Grafenwöhr were probably decisive for the choice. The 'Erlangen Panzer Courses', were for tank officers, NCOs and conscripts to learn all aspects of operating and fighting in the Panther. Maintenance personnel were also trained at Erlangen.

The training and reserve units of the Panzer divisions were responsible for the training of drivers and the other crew members as they arrived from supply depots. The serious situation regarding the lack of fuel and equipments made the work of the training units especially difficult. A report by the Panzer Reserve and Training Abt 33 at St. Pölten reflects this:

> The supply of PzKpfw III is insufficient. For this reason it was decided to use a PzKpfw Ia chassis with a wooden mock-up of a PzKpfw III turret. In this way the battalion succeeded in creating a whole platoon with wooden turrets. The crews can be fully trained on these vehicles since optics, guns, machine guns, traverse and elevation mechanism and radio are available. Another three vehicles with wooden turrets are under construction. Attempts to fit small-calibre guns are under way.
> From the first inspection carried out by me it is clear that training on the tank and the training itself does not meet the requirements for this sector of the field troops.... The companies only have access to a tank once or twice in week.... regulation must be introduced that every recruit has at least 30mins training on the tanks every day.
>
> General concerns and requirements in training:
> At 6.*Kompanie* (Panther AusbKp) the 90 men trained on the Panther courses outside the battalion cannot receive further training since there are no PzKpfw Vs available. The battalion has made a request for the supply of at least three PzKpfw Vs (one for the drivng school, two for battle training) otherwise the supply of reserves to Panther units will be jeopardized.



The training of crews for Panther units took place at several locations. Many new units were formed and also refresher courses were held at the large military depot at Mailly-le-Camp near Rheims. The helmet symbol painted on this Panther Ausf D indentifies it as being from PzGrenDiv Grossdeutschland. (Anderson)

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The Panther in Combat

6

The new Panther was deployed for the first time during the Kursk Offensive in the summer of 1943. Once full production was achieved more units were supplied. The PzKpfw IV also remained in production until the end of World War II.

After the defeat at Stalingrad, the German high command placed all its faith in an operation to regain the initiative in the east with a great show of strength. All available *Heeresgruppe Mitte* and *Süd* (Army Groups Centre and South) were heavily reinforced for an attack in the Kursk Bend.

The first signs looked favourable. A total of 22 Panzer and PzGren divisions made up the numerically greater part of the German force. More than 2,000 tanks stood ready, some 50 percent were armed with the powerful 7.5cm KwK 40 or StuK 40. Furthermore a decisive effect was promised from the army troops present with their new armour. Heavy PzAbt 503 and 505 and PzAbt 502 would be deployed in the operation with 90 PzKpfw VI Tigers. Since the end of 1942, this tank had already shown its extraordinary power on the battlefront.

Great hopes were also invested in two new types, the new PzKpfw V Panther and the heavy self-propelled assault gun Ferdinand (SdKfz 184s). But as neither could be delivered in time, the beginning of Operation Citadel was postponed on several occasions; in hindsight a fatal decision.

All elements of surprise in the period before the attack was lost. The Soviets had been alerted and reinforced their many kilometres of frontline with a system of interlocking trenches, protected by minefields and anti-tank gun positions waiting for the Germans to attack.

The Red Army brought into the area a large proportion of its available armour to defend the Kursk Bend. The majority of the tanks were T-34 and KV-1, but also many improved types including the T-26. Large numbers of British and US-built types had also been delivered under the Lend-Lease

At the alert: Panther 432 is ready for an attack by Soviet armour. Although officially prohibited, many crews continued to use links or sections of track to reinforce the armour on their tank, especially to protect the fuel tanks. (Anderson).

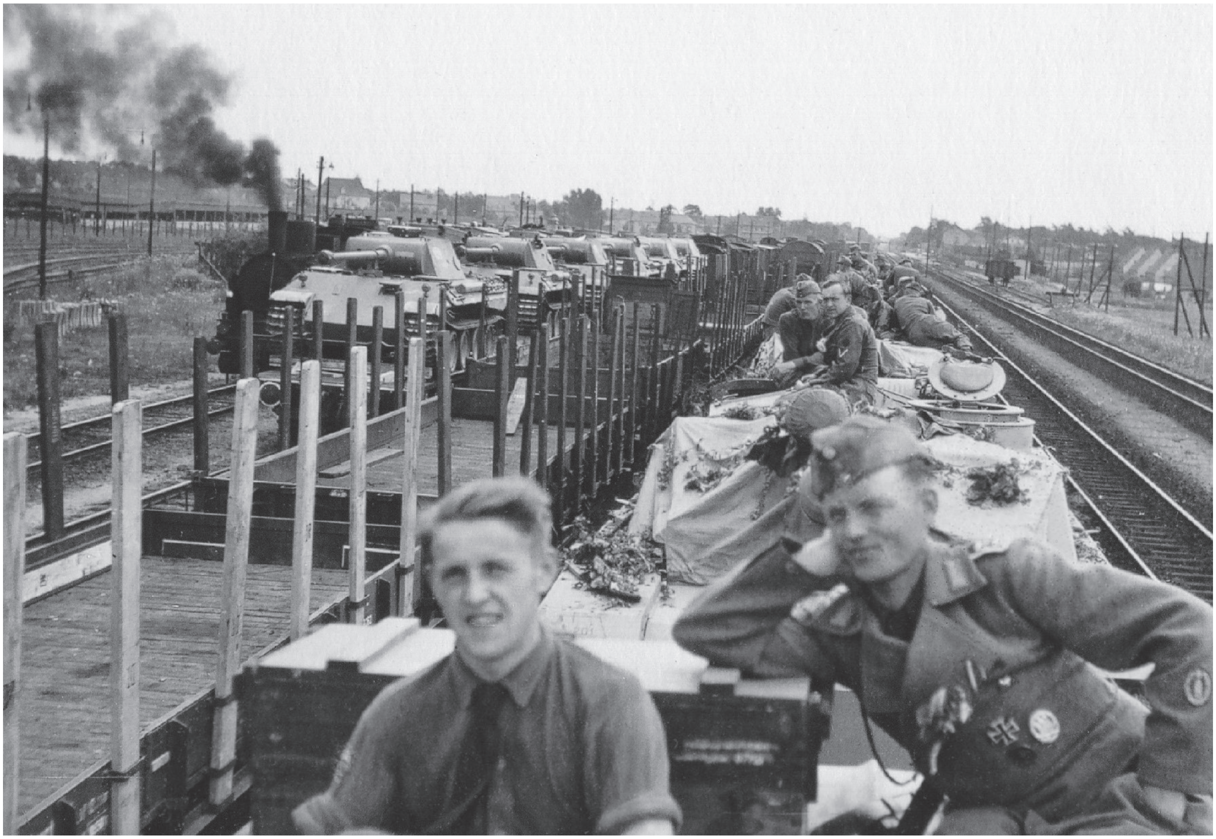
Program. By 1942, the Soviet armaments industry had sufficient capacity to quickly replace the immense losses suffered in previous battles. Basic improvements to the numerically most important T-34 were not possible, but in 1943, after the German defeat at Stalingrad, this situation would gradually change. Soviet designers now concentrated their efforts on the development of more powerful guns and ammunition to defeat the Tiger and any new German tanks which appeared on the battlefront.

Panther at the Front

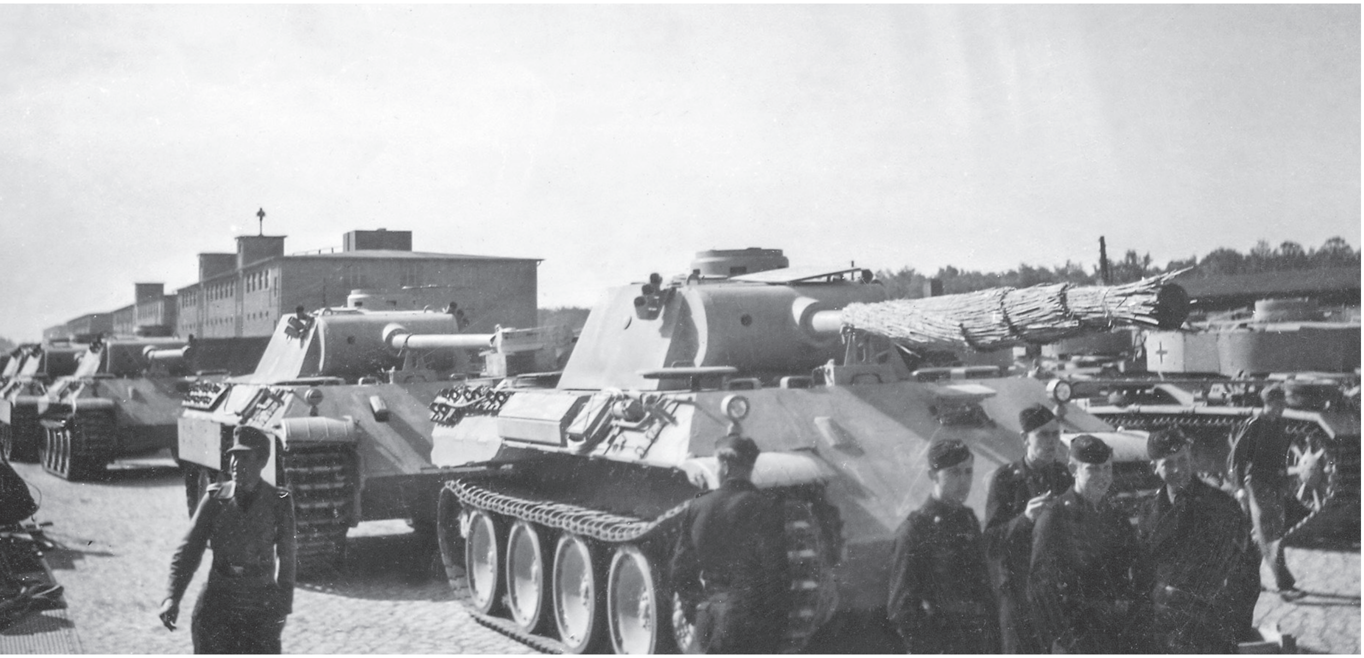
Deliveries of the PzKpfw V Panther began in February 1943, but less than 20 vehicles were received by tank units. Larger numbers were expected to leave the factory in May.

Meanwhile two Panther Abt had been formed (PzAbt 51 and 52) and were to be absorbed by a regiment. In April 1943, the battle staff of the experienced PzRgt 39 (17.PzDiv) was detached to take over the two battalions.

PzAbt 51 came into being in December 1942 from II./PzRgt 33 and transferred to St Pölten to form. PzAbt 52 originated from I./PzRgt 15, the operational and tactical training on the Panther being undertaken at Erlangen.



Men of a self-propelled assault gun unit wait for the journey to start. In the background, six Panthers from PzRgt 39 have been parked on the track prior to loading. The German Army used rail transport even for short distances. (Anderson)



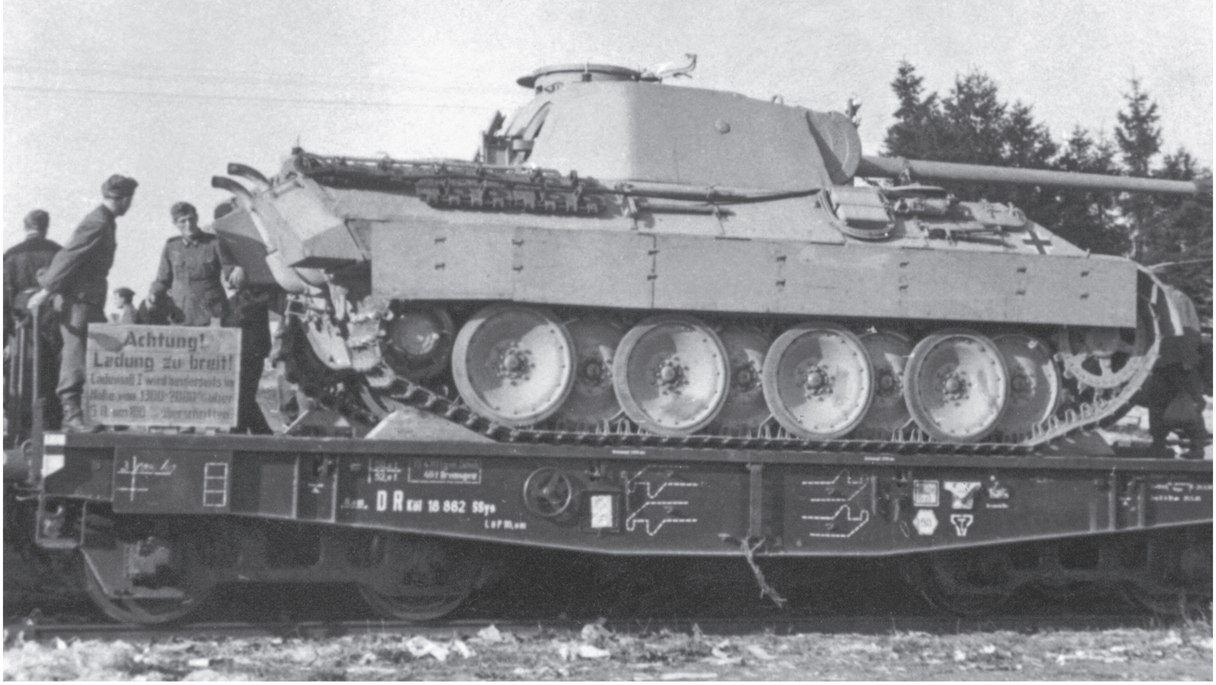
Panthers of PzRgt 39 awaitng loading; the first tank has straw matting wrapped around the long barrel of the 7.5cm KwK 42 L/70, in an attempt to camouflage the new weapon. The tank has a metal box on the left-hand side of the hull; only a few Panthers were so fitted. (Anderson)

Both battalions were organized according to KStN 1150a and 1177 of 10 January 1943. Because the *Bergepanther* with 40-ton capacity winch was not yet available, each battalion received two turretless Panther recovery tanks fitted with a recovery anchor.

In retrospect the process of arranging the formations can only be described as chaotic. In February 1943, only 16 Panthers were available. In the following weeks and months it was evident that development and production of the Panther did not correspond to generally accepted procedures. From the beginning, the designers and manufacturers were placed under unprecedented pressure to improve the situation. Because it was planned to deploy the Panther for Operation Citadel, the tank entered service without individual components being thoroughly tested and before all running trials had been completed. During training and exercises in the terrain, numerous problems plagued the vehicles at Grafenwöhr, and there could be no question of using the Panther in combat.

Hitler personally demanded that front-line troops should test the Panthers, and he did not want to hear objections. He was aware that correcting known defects in series production would only be possible with the greatest difficulty. He made his views clear at a Führer conference on 4 May 1943:

> 1.) The Führer has presented the individual tank figures for April including the expected production up until 12 May. Because the offensive this summer is dependent on having a superior number of tanks, the Führer expects that no effort will be spared to maintain these figures, and also if at all possible, to increase them. This applies above all for the months of May, June and July.



The PzKpfw V Panther fitted within the dimensions stipulated by the *Deutsche Reichsbahn* (German National Railways). Although not as wide as a Tiger, which had narrower tracks fitted for transport by rail, nevertheless a board has been erected to warn of excess width. (Anderson)

> 2.) Since the trial runs with the first two Panther prototypes did not reveal any real defects, and all defects first came to light when the initial series-built vehicles were with the units, the Führer recommends that in future no prototypes will be built for testing purposes as otherwise the possibility will exist that these will have been manufactured with greater care and expenditure of time and so will tolerate greater demands made of them as would a standard production vehicle.

The development and completion of a tank was and is a complex. In all phases of development small defects naturally come to light and sometimes more serious failures. After the first pre-series Panther models were built, as normal there followed a thorough examination on the testing grounds and if possible also with the troop units. These tests were supervised by engineers who worked with the units to document the results. These results then flowed into vehicle development before mass production began. As an indication, this took two years for the PzKpfw III. But this process was not maintained in the case of the Panther, as it had only been available for a year. Up until the end of July 1943, pre-production series vehicles were leaving the factory without testing or trials.

After delivery to the units the Panther was found to be unfit for front-line duty. After receiving the first vehicles, PzAbt 51 found hundreds of faults, both large and small, which they listed:

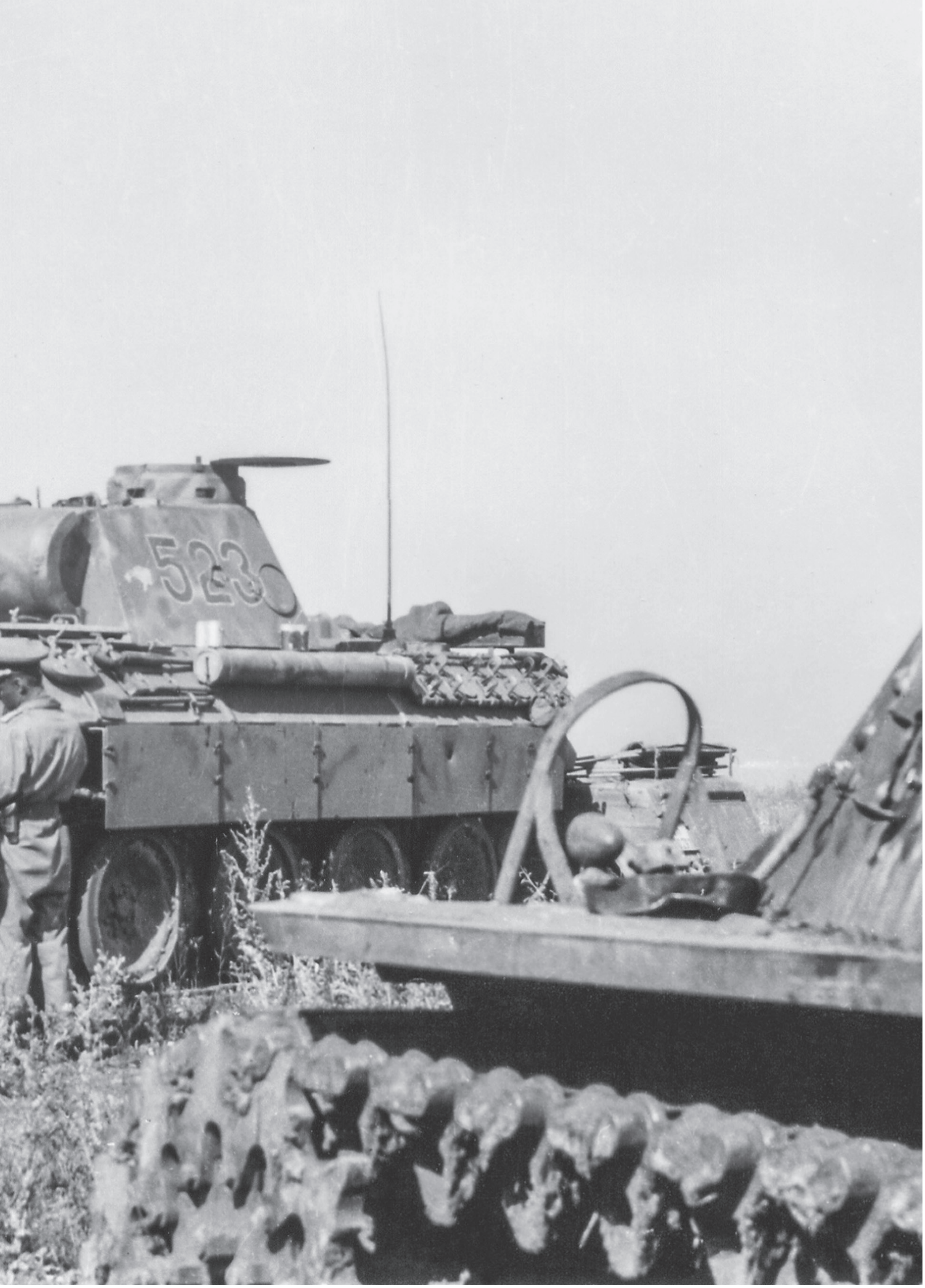
- Leaking fuel tanks due to defective welded seams
- Numerous engine fires due to defective fuel pumps
- Transmission defective: final drive units and gearbox fail

- Some torsion bars too weak
- Amphibious travel not possible on account of defects
- Major ventilation problems in the engine compartment on account of measures needed to seal it against the ingress of water when submerged
- The hatches for the driver and wireless operator obstruct the turret, further work essential
- Exhaust fumes in the turret, insufficient ventilation

To get the 200 Panthers requested for Operation Citadel by the time specified, a comprehensive redesigning and modifications programme was necessary. In order not to interrupt production, the Panthers which had been delivered were sent in small batches to DEMAG where they were gradually upgraded.

At the time, it was standard practice on the production lines at German armaments factories to add modifications at the completion stage, these also included recommendations sent in by front-line forces. Also technical improvements or the introduction of more economic assembly methods were implemented. Because many suppliers were involved, these measures could not always be coordinated. The manufacturers of the Panther – MAN, Daimler-Benz and MNH – received notification of the modification work carried out by DEMAG, but not all could be incorporated in the short term.

Panthers of PzAbt 51 before the beginning of the attack on Kursk. Five Soviet prisoners captured in an earlier action await collection and interrogation. (Anderson)



Men of PzAbt 52 making preperations for an attack. To the left of the turret number is the stylized head of a panther; a symbol which appeared on many of the regiment's Panthers. (Hoppe)

Crewmen eating their meagre rations in the shadow of their Panther. The vehicle has been camouflaged without due care, but at least the gun muzzle has been protected with a dust cover. The side aprons for protection against Soviet anti-tank weapons are still intact; they easily became detached in action. (Hoppe)

Because production could not be interrupted, in the summer of 1943 a number of vehicles unfit for service were delivered for modification work to DEMAG; some was completed by engineers near the frontline.

On 17 June 1943, Heinz Guderian observed in a letter to the Chief of the General Staff *Generaloberst* Kurt Zeitzler:

> Based on the report the Führer has made the following decisions:
>
> 1.) Panther
> The results of the improvements made to the gunlaying optics are awaited and are to be reported to the Führer.
>
> 2.) The Führer is agreed that the Panther-*Abteilungen* of the SS-Leibstandarte Adolf Hitler and SS-Das Reich are to be transferred to Grafenwöhr. Camp de Mailly in France is to be used to capacity by two army battalions.
>
> 5.) The Führer expressed his great satisfaction at the report that it is expected by 31 December 1943 to have operational 20 Panther-*Abteilungen*, including four for the SS, and 13 Tiger-*Abteilungen*, including three for the SS.
>
> 6.) Similarly the Führer is agreed with the proportionate equipping of all Panzer divisions [together with 1.PzAbt Panther. Author] one PzAbt with up to 96 Pz IV lang and one Panzer reconnaissance battalion of five companies.

At the end of January 1943, PzAbt 52 was created out of I./PzAbt 15 and transferred to Grafenwöhr. In June this second Panther-*Abteilung* received

96 Panthers (after modification at DEMAG). Organized training on the new vehicle was very difficult for the battalion.

At the beginning of July 1943, PzAbt 51 and 52 de-trained at Kharkov. Both were absorbed into PzRgt 39 (Army troops)/PzGrenDiv Grossdeutschland making it by far the best equipped German unit. This assembly of such a powerful force under a single command would later become the subject harsh criticism.

PzRgt Grossdeutschland	20 Pz III lang
	63 Pz IV lang
	15 PzKpfw VI Tiger
	14 Flamethrower tanks
Pz Rgt 39	200 PzKpfw Panther

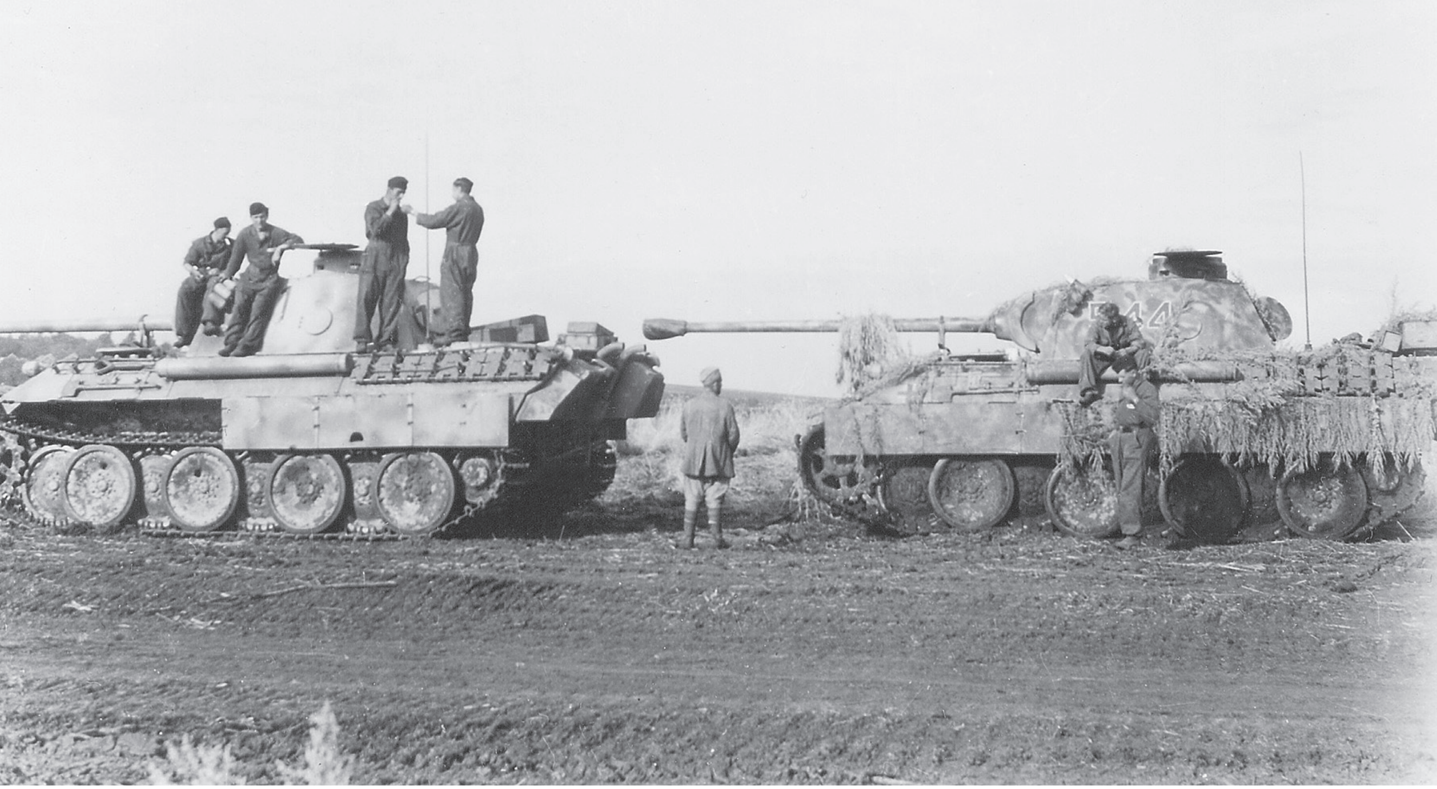
The German attack began on 4 July 1943. After a heavy artillery bombardment, PzRgt 39 with PzRgt Grossdeutschland attacked in the southern sector. On 12 July 1943, PzGrenDiv Grossdeutschland reported the following tanks as operational:

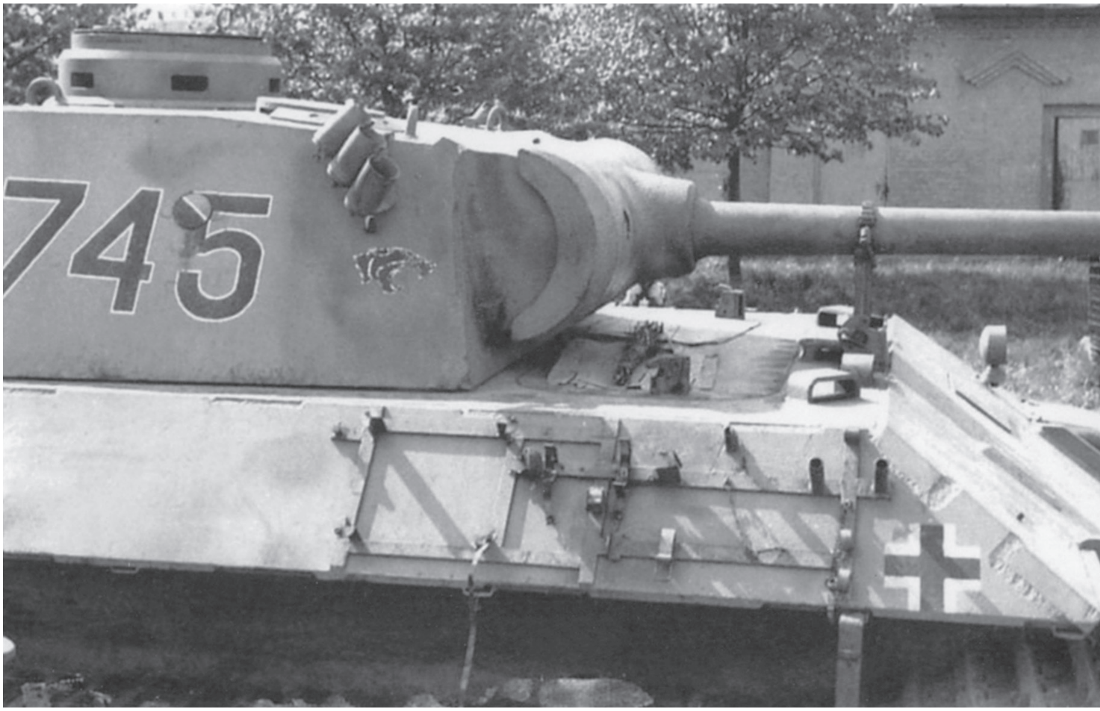
20 PzKpfw III and IV
2 PzKpfw VI Tiger
25 PzKpfw V Panther

By 17 July 1943 the situation had improved to:

20 PzKpfw III and IV
23 PzKpfw IV (lang)
Eight PzKpfw VI Tiger
44 PzKpfw V Panther
Ten flamethrower tanks

Elements of PzRgt 39 assemble in a gulley, hidden from ground observers, ready to replenish with ammunition and refuel. At the same time teams of engineers would be able to carry out simple repairs and routine maintenance. (Anderson)





Above:
The crews of two somewhat battle-worn Panthers enjoy a break in operations. The leading tank is missing parts of the side aprons. (Hoppe)

Right:
A Panther of PzAbt 52 was captured by Soviet forces then put on public display. Outwardly it appears undamaged, but a closer inspection reveals that a shell has deflected off the gun mantlet and dented the hatch over the radio operator’s position. The stylized Panther head symbol of the unit is painted to the right of the turret number. (Anderson)

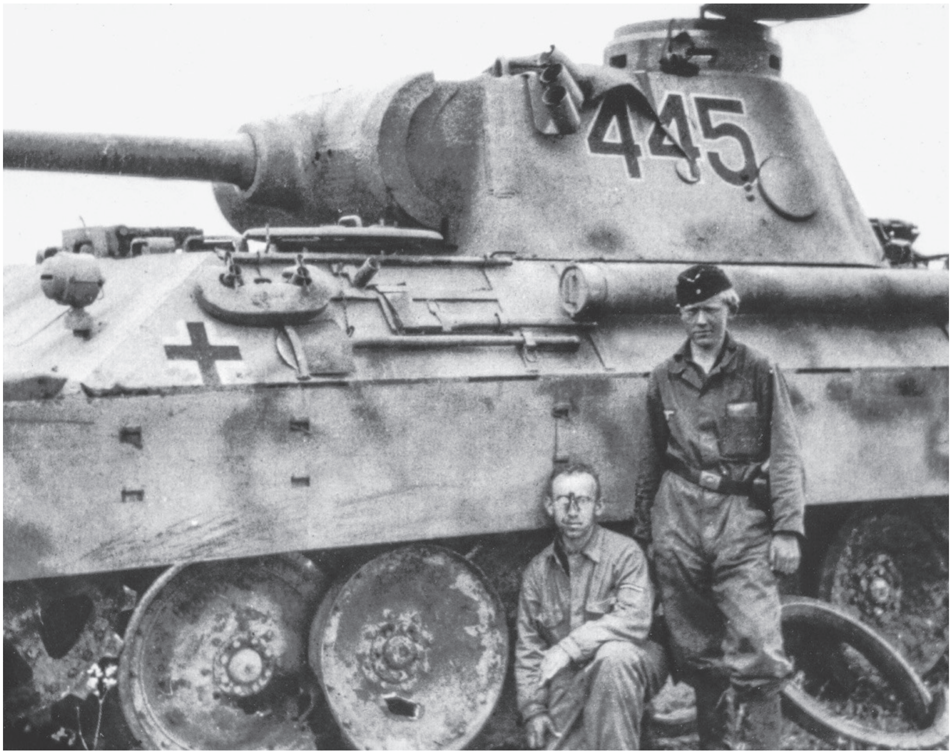
A PzKpfw III Ausf L or M (the type had lost much of its fighting value by 1943) is passed by a Panther Ausf D. (Anderson).

The Battle of Kursk did not follow the course the Germans expected. In the northern sector (*Generaloberst* Walter Model) German units were halted by the well-built Soviet trench system. Despite the fact that the Ferdinand heavy assault guns were supported by other self-propelled assault guns, and other units, the breakthrough attempt failed. Trench warfare now threatened, for the numerically inferior Germans a grave development.

In the southern sector (*Generaloberst* Erich von Manstein) the fighting went much better. The Soviets suffered very heavy losses during their counterattack at Prochorovka against XXXXVIII.PzKorps and II.SS-PzKorps. After the battle they were forced on the defensive. A German breakthrough might have been possible here, but because of the strained situation in the northern sector it was decided not to make an attempt.

The Allied landings in Sicily in July 1943 destroyed any hope of reinforcement which might possibly have helped overcome the stalemate in the east. Even if the Germans losses were sustainable, the lack of reserves had a negative effect. Despite a significant superiority in weapon technology, the German Reich had largely lost the capability for operational warfare, and with it the initiative.

The high expectations which had been invested in the new Panther could not be fulfilled. Shortly after the abandonment of Operation Citadel, the Inspector-General of Panzer Troops wrote on 17 July 1943 to *Generaloberst* Kurt Zeitzler:



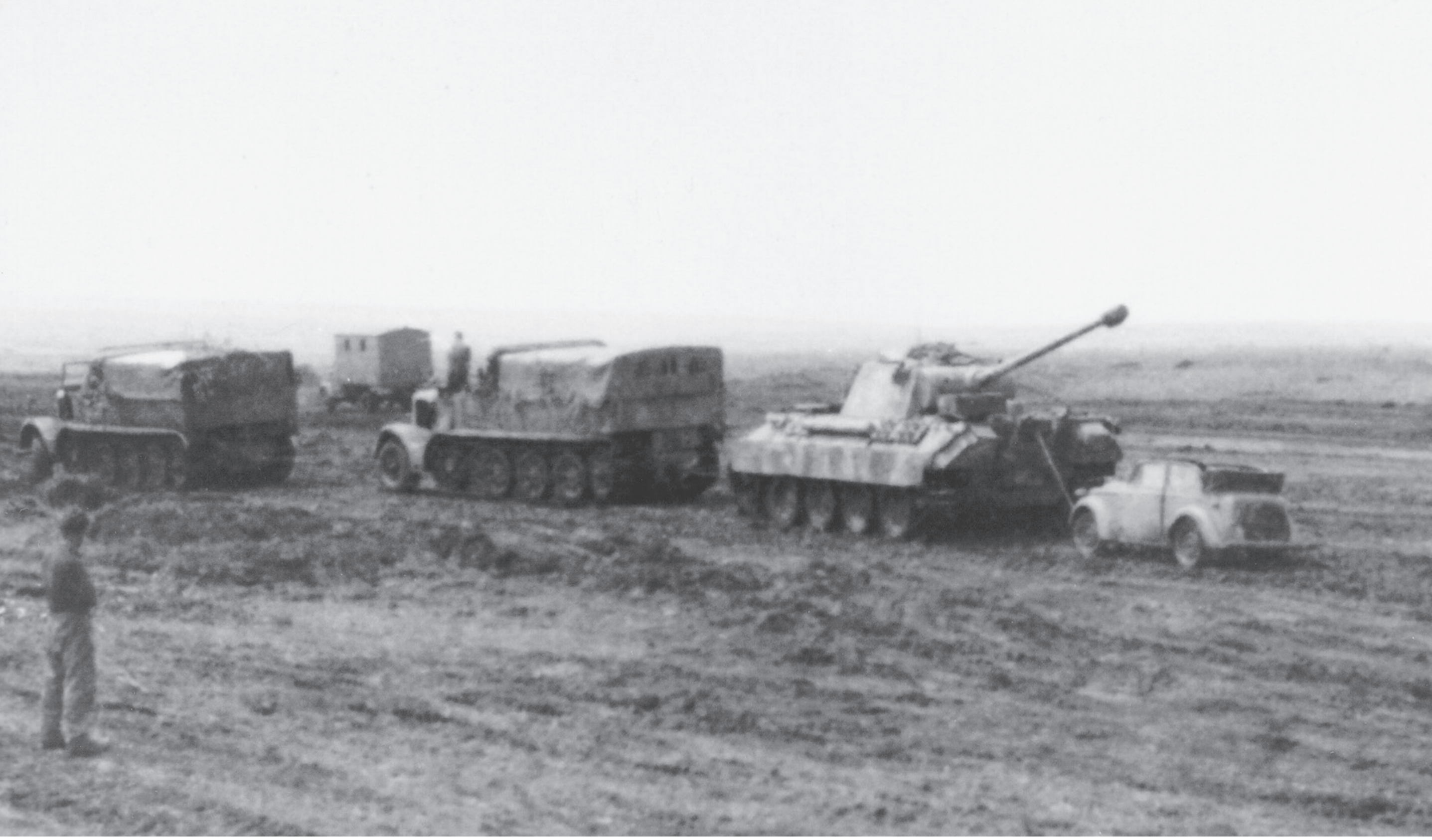
Two battle-fatigued crewmen are attempting to replace a running wheel which has been damaged by shell splinters. Lengths of the rubber tyre have been ripped off, but the side aprons remain intact. (Anderson)

To the Chief of the Army General Staff
Herrn General der Infanterie Zeitzler
Enclosed herewith I am sending you five copies of reports on the operational experiences of PzRgt (Panther) von Lauchert and of heavy PzJgRgt 656 (Ferdinand and assault tanks) which I put together in connection with my visit to the frontline.
Signed Guderian.

Report on the operation of PzRgt (Panther) von Lauchert:
I.) Tactical Experience
The operational use of a new tank type does not free the leadership from the proven principles of tank warfare. This is especially the case with regard to the cooperation with other branches and of operations with formations of tanks.

The Inspector-General had formed a Panzer Brigade Staff for the Division Grossdeutschland reinforced by the Panther-Rgt in order to secure the more than 300 tanks of that division. As the result of personal friction this staff was not used initially for the operation. The leadership of the tanks suffered accordingly just as much as the cooperation with other branches did. Personal considerations should have no place if the fate of the Reich is at risk.

It is wrong, where tanks are being deployed, to withdraw other strongpoint weapons just because Panthers are present.



Two s ZgKw 18t (SdKfz 9) tow a failed Panther off the battlefield. Up to five of these heavy towing tractors were required for this task depending on the terrain. For reasons unknown, a saloon car has been attached to the Panther. (Münch)

It is much more correct to build a clear and unmistakable additional strongpoint with other branches (artillery, pioneers, *Luftwaffe*, armoured personnel-carrier battallions) in order to combine with the Panthers for an effective penetration and rapid success with few losses.

The attack must be carried forward quickly into the depths of the enemy's defensive system in order to take out his artillery and secure the advance of the PzGren and infantry.

After the serious losses of the first few days those succeeding losses were relatively greater because the number of Panthers going into battle was very few (at that time only ten Panthers), and it was easier for the enemy to register successes, this all the more so because support for the Panthers from other branches was not sufficiently guaranteed.

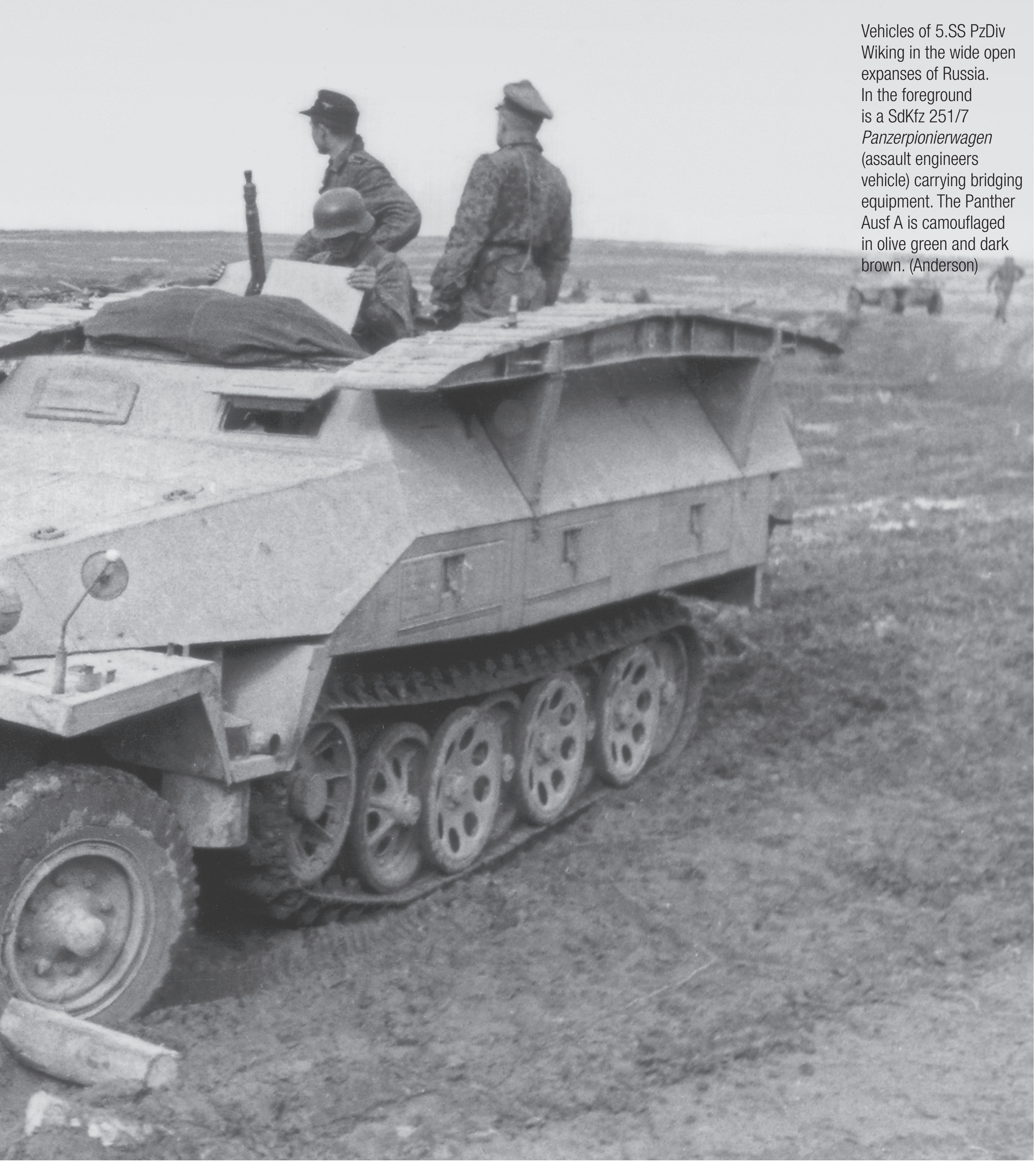
The enemy defences using 7.62cm anti-tank and tank guns was only successful against the Panthers on their flanks. No penetration of the frontal armour was achieved. From this it must be inferred that attention must be given primarily to protecting the flanks of the Panther attack.

All available other branches of service must be involved in this aim.

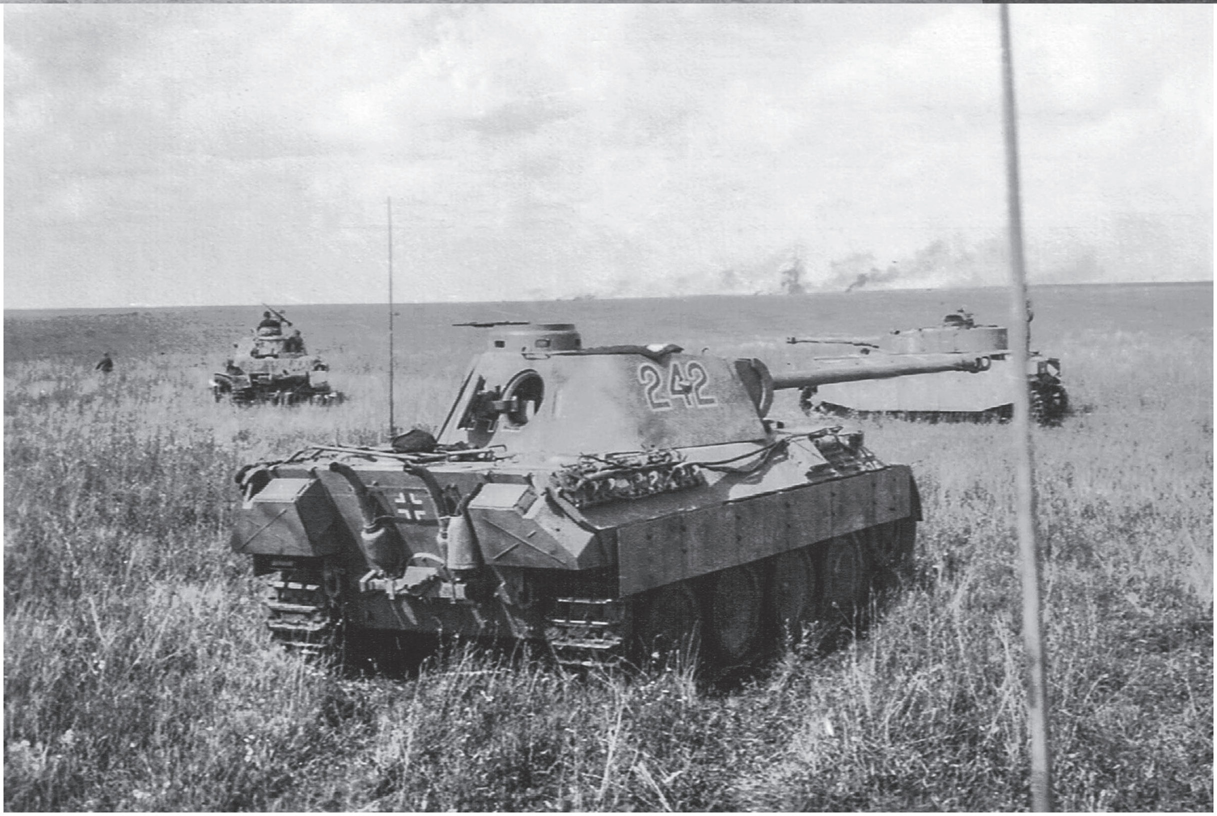
The Panther contingent must be spread broadly for the attack in order to prevent flanking of the main attack force.

Under fire, individual vehicles are to turn to face the source.

When crossing a deeply staggered, mined battlefield, in future a detachment of PzKp (Fkl) must be provided.



Vehicles of 5.SS PzDiv Wiking in the wide open expanses of Russia. In the foreground is a SdKfz 251/7 *Panzerpionierwagen* (assault engineers vehicle) carrying bridging equipment. The Panther Ausf A is camouflaged in olive green and dark brown. (Anderson)



Above:
Panther ‘242’ follows two PzKpfw IV as they seek-out targets in the open expanses of the Russian hinterland. The side aprons were delivered shortly before Operation Citadel, but not all Panthers were fitted in time. (Anderson)

Opposite:
Re-ammunitioning a Panther of PzAbt 51. The crewman is carefully passing a shell down, through the wireless operator’s hatch. A stylized Panther has been painted on the side of the turret. (Anderson)

Timely cooperation with pioneers must be obtained in any case. Materials for crossing swampy land are to be carried in a ready state in order to avoid stoppages during the course of the advance.

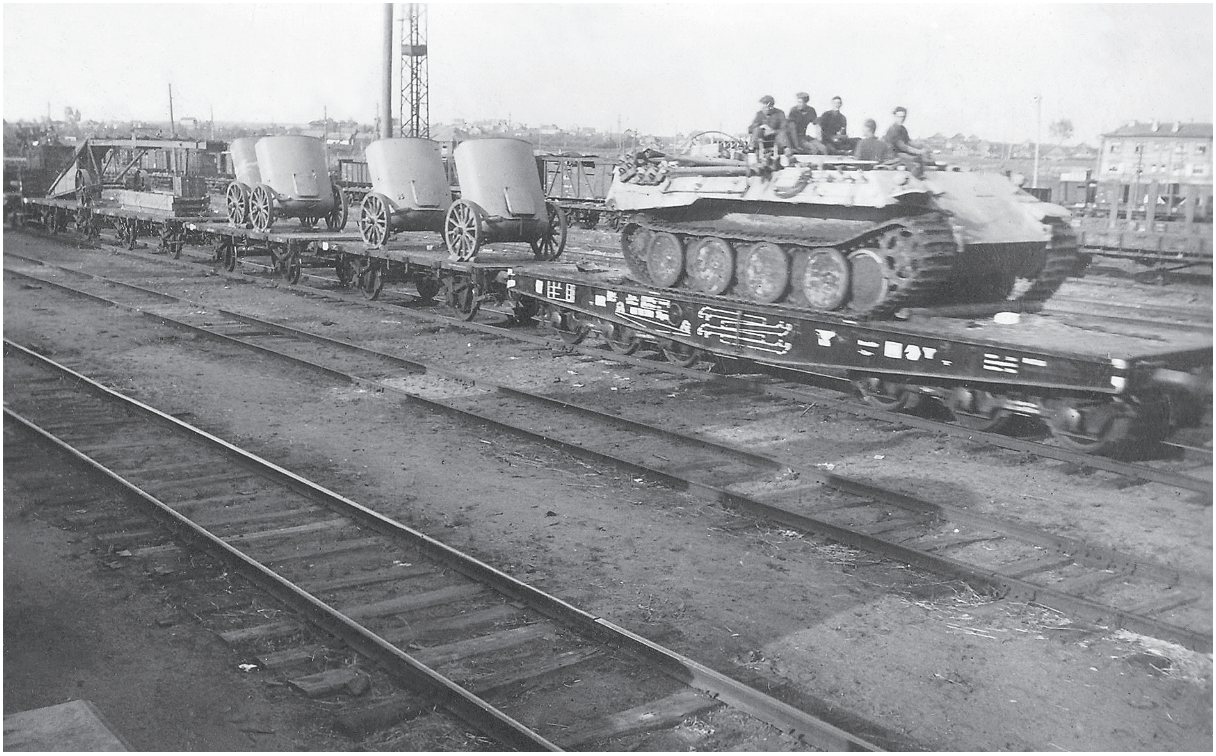
II.) Organization
The structure of the fighting staff echelon of the Panther regiment has been proven. In no case should the platoons, companies or battalions be weaker. The allocation of wheeled vehicles can be reduced especially because supplying all tanks is practically never necessary on account of the constant breakdowns.

III.) Training
The period for training has been too short.
The drivers have not had the necessary practice. The technical personnel are not sufficiently trained, the gunlayers and commanders have not received the necessary tactical training.

Because of the conversion work required at Grafenwöhr, exercises were only carried out at platoon strength.

This lack of training has made itself very noticeable. A large percentage of the technical and also tactical failures are attributable to it.

IV.) State of the regiment after seven days in action
In the opening days a reduction in battle strength occurred as a result of enemy action and technical breakdowns. On the evening of 10 July 1943 there were:



PzAbt 51 and 52 were equipped with four Panther panzer recovery hulls; one such vehicle has been loaded on a SSyms railway waggon for transport to front-line forces. The type was not fitted with a winch and was used only for towing immobilized Panthers. (Anderson)

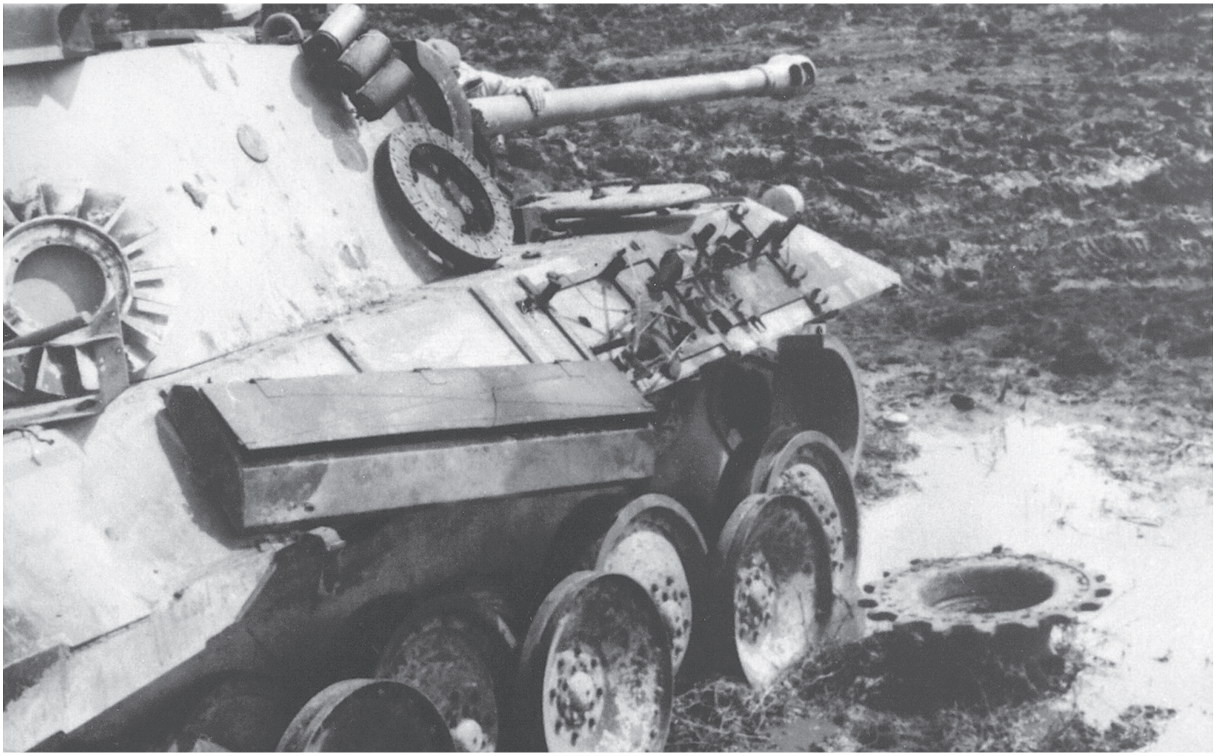
Fighting the enemy	10 Panthers
Totally destroyed	25 Panthers (23 hit by enemy fire and burnt out, two caught fire during the advance.)
Work with repairs units and workshop	100 Panthers of which:- (56) with shell or mine damage (44) with mechanical damage (Note: some 60 percent are light repairs.)
Repaired and advancing to open area	c.40 Panthers
Remainder	c.25 Panthers not yet reached by repairs service.

On the evening of 11 July 1943 there were:

On active service	38 Panthers
Written off	37 Panthers
Under repair	131 Panthers

A gradual rise in the fighting strength is expected.

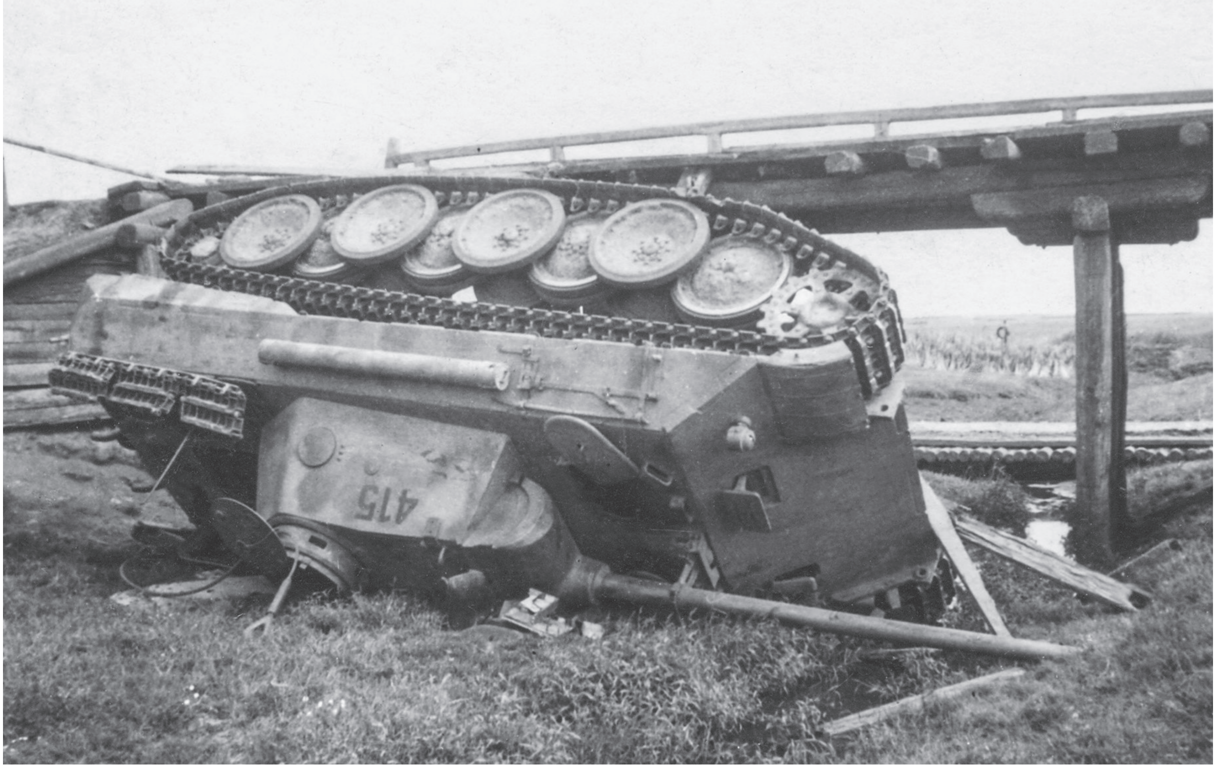
The large number of Panthers out of action due to enemy fire (81 Panthers, up to 10 July 1943) is an indication of the heavy fighting. The deeply staggered, heavily mined main Russian battlefield was bound to lead to an above-average failure of tanks from artillery and mines. Even the PzKpfw IV and Tiger were not spared.



The battle around Kursk was hard fought. This heavily damaged Panther has thrown its tracks, and most of the running wheels have lost their rubber tyres. Also the drive sprocket has blown off, immobilizing the tank: it would be very difficult repair. (Münch)

> The fact that the Panther appeared on the battlefield for the first time exposed it to general interest. Comparisons with the defects of other tank units was not made. Therefore operational commands and troops quickly drew the premature conclusion that:
>
> The Panther is no good!
>
> In conclusion,it should be noted that the Panther did prove itself in action. That technical failures in large numbers were bound to appear in the early days had to be expected, since testing by the troops at the depots has not been carried out.
> The curve on the graph shows that the number of vehicles operational is rising.
> After modifications to the fuel pump and engine, technical failures will remain within normal limits.
> The relatively high number of vehicles immobilized by enemy action is an indication of the heavy fighting.

When the attacks using the Panther began major problems were revealed; many were due to how the forces were were organized. The subordination of PzRgt 39 and PzGrenDiv Grossdeutschland into the newly formed PzBrig 10 created a large unit apparently difficult to lead. The various staffs could not work in harmony and the areas of jurisdiction were not clearly defined. In hindsight, a better option would have been to incorporate the new Panther in the battle-proven Panzer divisions.



The Soviet Union has many wet regions, and this made it necessary for German forces to be adept at bridge building. The ever-increasing weight of tanks did not make the work of the pioneer sections any easier. (PeKo)

The cooperation of the Panther companies with other smaller elements also met with little success. Orders sent to Tiger units were often cancelled then re-sent to Panther units as battlefield commanders thought the new medium tank was superior.The artillery cautiously followed the tanks, anti-tank units were absent for the important task of protecting the flanks of the Panther attack. Minefields were not identified or cleared.

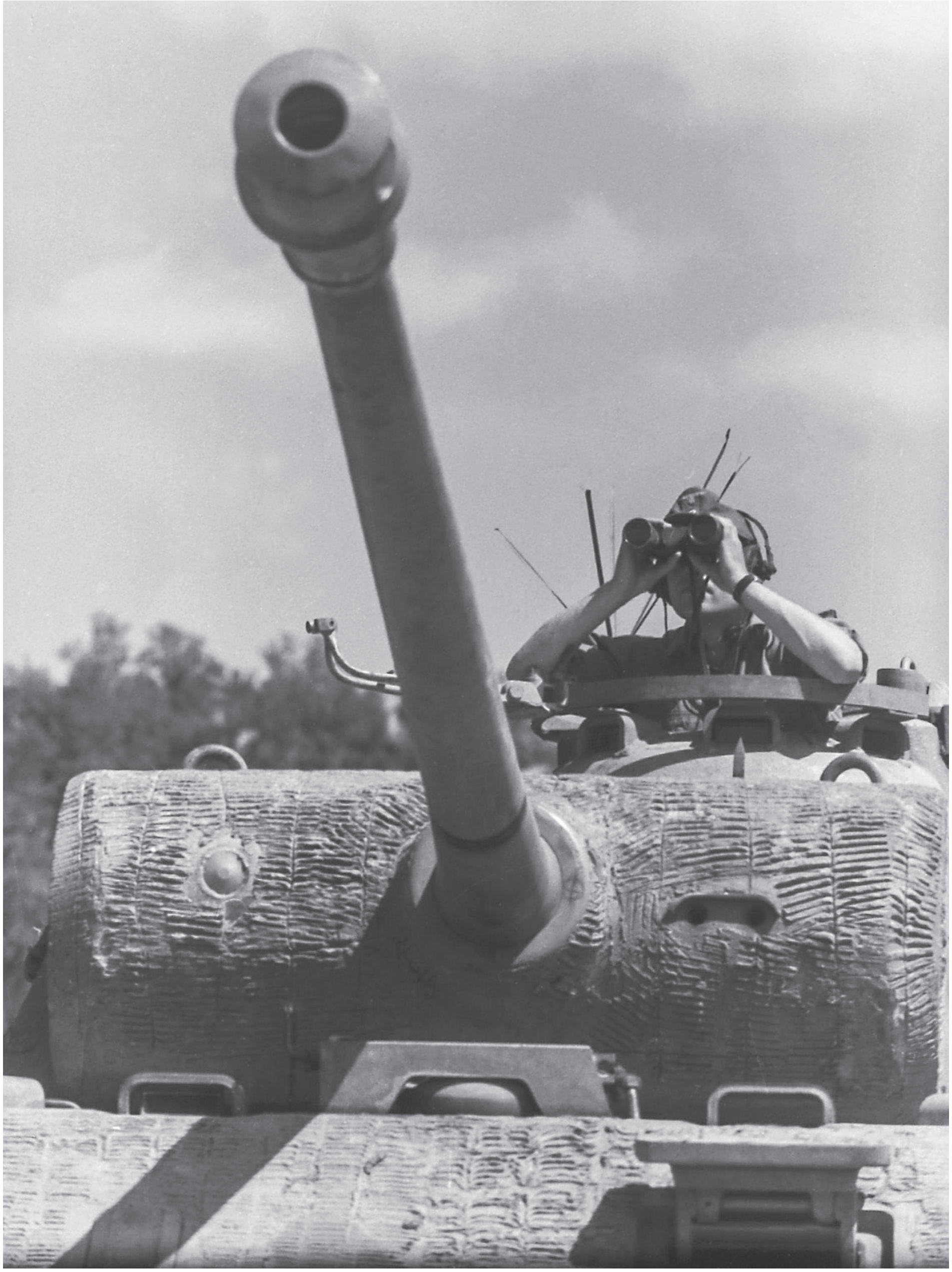
An additional problem was that the Panther was more manoeuvrable than the vehicles of the Panzer-grenadiers and other elements; the *Schützenpanzerwagen* (SPW – armoured infantry carriers) quickly fell behind in the terrain.

The advantages of the Panther – superior frontal armour and a powerful gun – were cancelled out. The hitting power of the 7.5cm KwK 42 L/70 became somewhat academic; when the tank came close to or broke-through Soviet lines, their numerous anti-tank batteries opened fired on their vulnerable sides. This reduced the fighting value of the Panther to that of the PzKpfw IV. With better coordination, many losses would have been avoided.

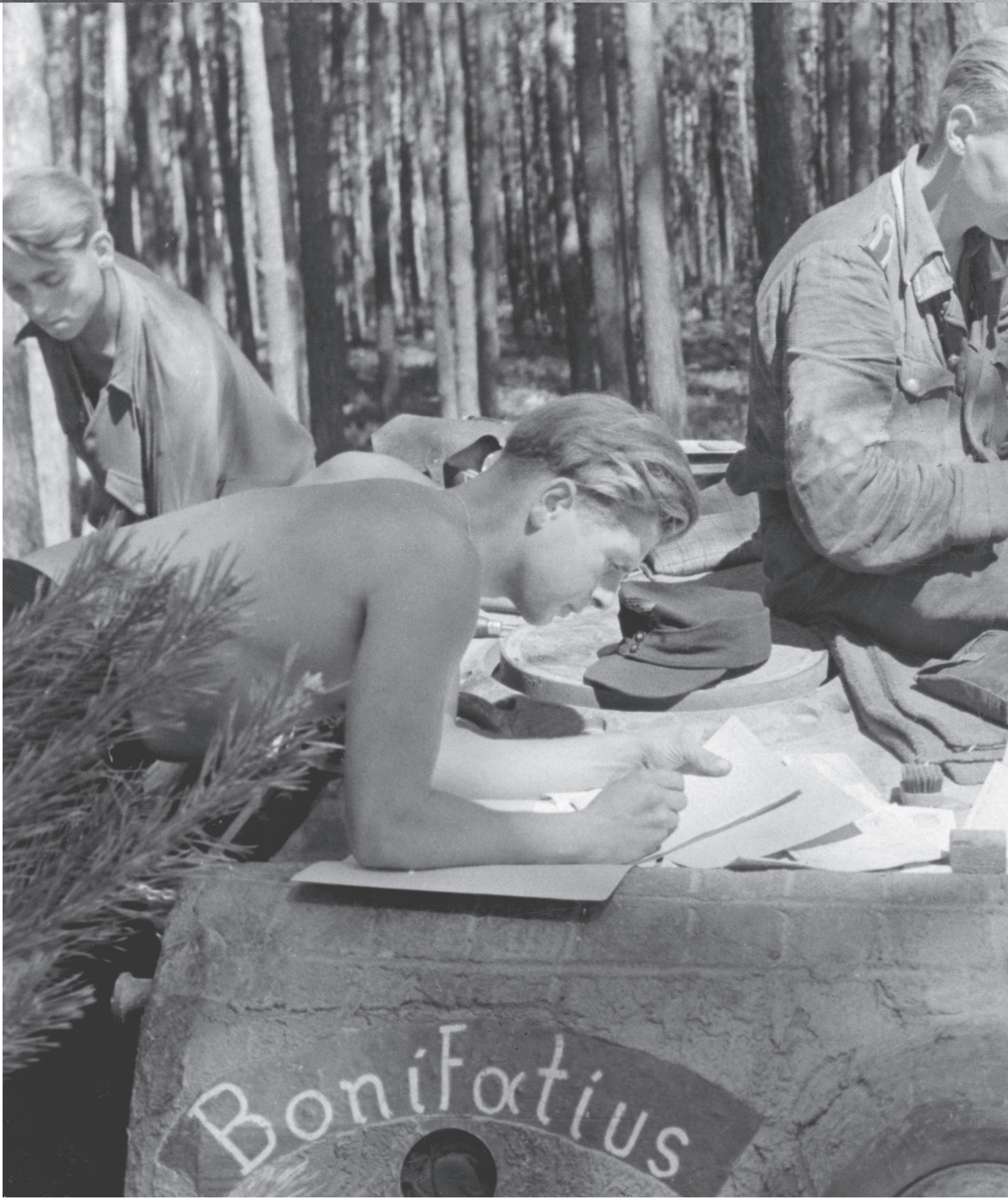
A later attachment to the report read:

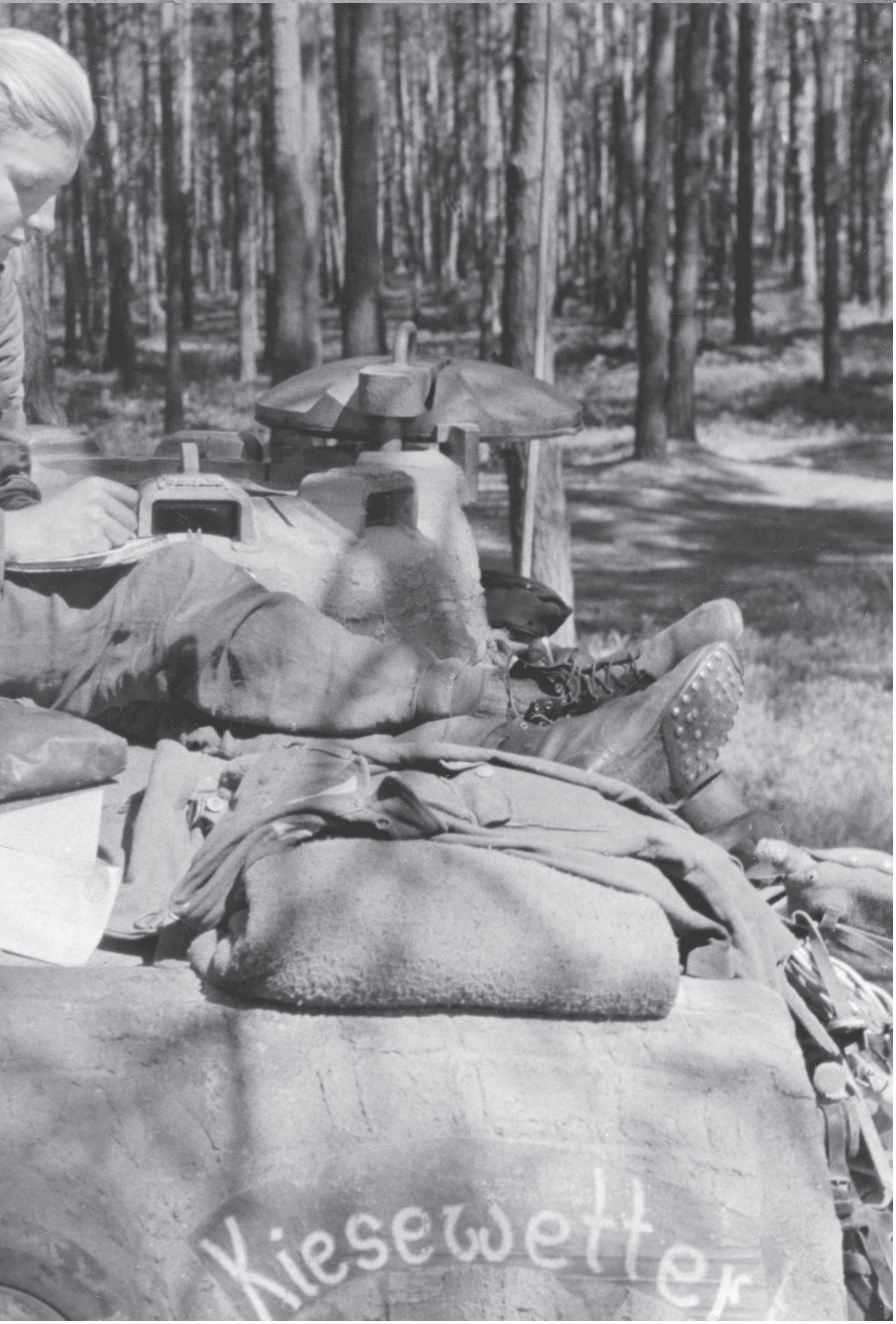
> Individual experiences regarding the Panther operation
> Weaponry:
> The main gun:
> Hit and penetration is good. By 10 July 1943, 140 enemy tanks had been destroyed. The average range was 1,500m to 2,000m. A T-34 was even destroyed at 3,000m.

As the result of anti-tank grenade hits on the barrels of our tanks some were put out of commission (interior bulging).
The ability of the commander to observe the field was made difficult by smoke from the gun breech after the third round which made his eyes water (periscopes were not available!) Repairing damaged gun barrels with metal sleeving taken from other damaged vehicles cannot be achieved. Supply depot necessary.

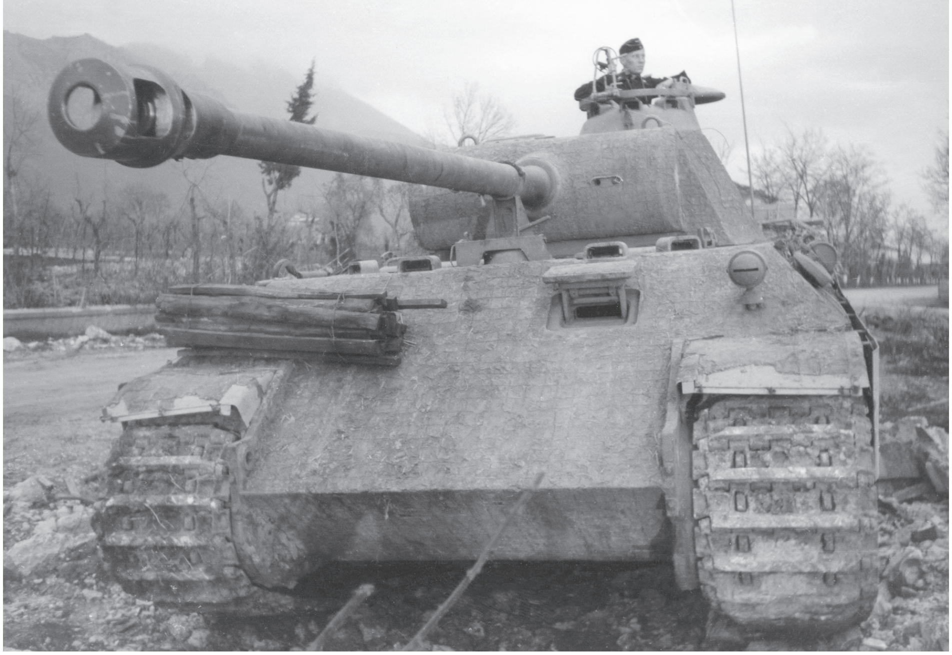


The commander of a *Panzerbefehlswagen* from I./PzRgt 4 surveys the terrain through binoculars. A *Sternantenne* (star aerial) D for the FuG-8 radio is visible, as is the the mounting ring for an MG. Note the port for the coaxial MG in the gun mantlet has been plugged. (Panzerfoto)


Bonifatius



This Panther bears the name of Bonifatius Kiesewetter, a German author who wrote obscene poems during the reign of the Kaiser. The vehicle has a coating of Zimmerit anti-magnetic paste, and the ring mounting for an MG has not been fitted on the cupola. (Anderson)



An early Panther Ausf A, the 7.5cm KwK 42 L/70 has been locked in the transportation cradle in preparation for the march to a fresh location. The cupola has been fitted with a ring mounting for an MG. Many tanks of I./PzRgt 4 carried fascine bundles which were rolled out to cross a ditch or marshy ground. (Münch)

Machine guns:
These in general were very reliable. On some weapons expansion of the rifling caused blockages. Apparently the material is of poor quality.
The metal in the belt feed bent easily.

Smoke candle launchers:
These are not viable as they are quickly destroyed by enemy fire. The development of a workable method of making smoke must be expedited.

Fallschirmjäger (paratroopers) hitch a ride on the engine deck of a Panther. The tank has received a coat of Zimmerit anti-magnetic paste, as standard. However, there is still much debate as to its usefulness in combat. (Anderson)

Two PzKpfw V Panther Ausf As from I./PzRgt 4 pass through an Italian orchard. The nearest Panther is a *Panzerbefehlswagen* (command vehicle), indentifiable by the *Sternantenne* (star aerial) mounted on the engine deck. (Historyfacts)

Armour:
All enemy anti-tank fire failed to penetrate the frontal armour of the PzKpfw V Panther. Fire from 7.62cm anti-tank and tank guns falling vertically on the cupola also failed to penetrate.

However, the sides of the Panther were penetrated even at ranges over 1,000m. On the turret and also against the sloping and vertical hull sides, fire from 7.62cm anti-tank guns and tank guns went through; subsequently most Panthers so hit burst into flame, probably on account of the large amount of explosive in the shell.

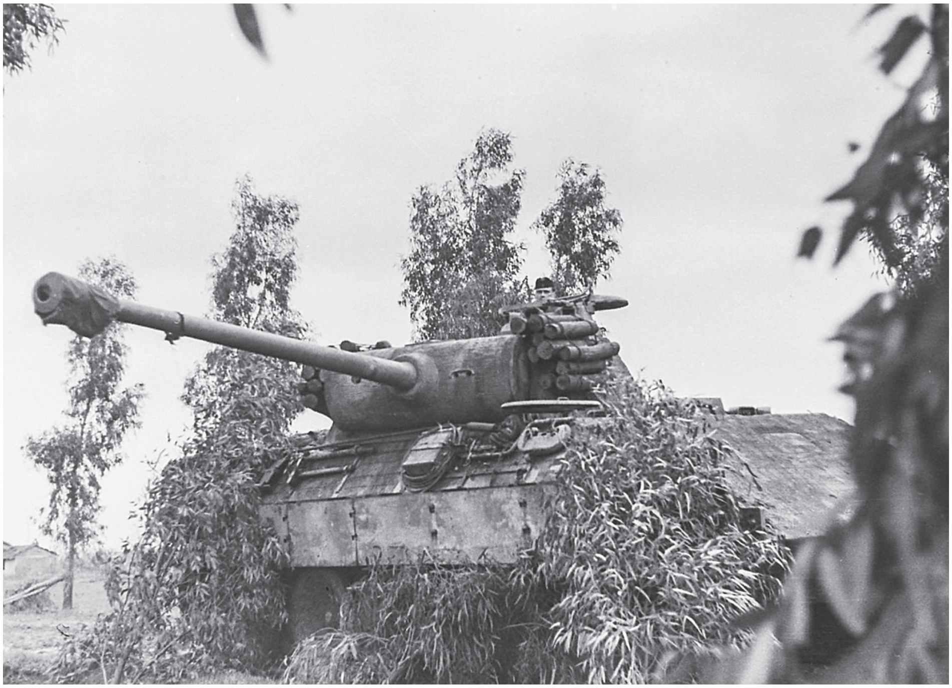
Suggestion:
Reinforcement of the side armour, as soon as possible, during production. Also fitted as supplementary armour to newly delivered vehicles. In general, the Panther is not vulnerable to artillery fire, only by a direct hit on the roof of the fighting compartment by a 15cm (or heavier) shell will force the armour into the interior. Light calibre hits on the cupola and roof armour had no effect.

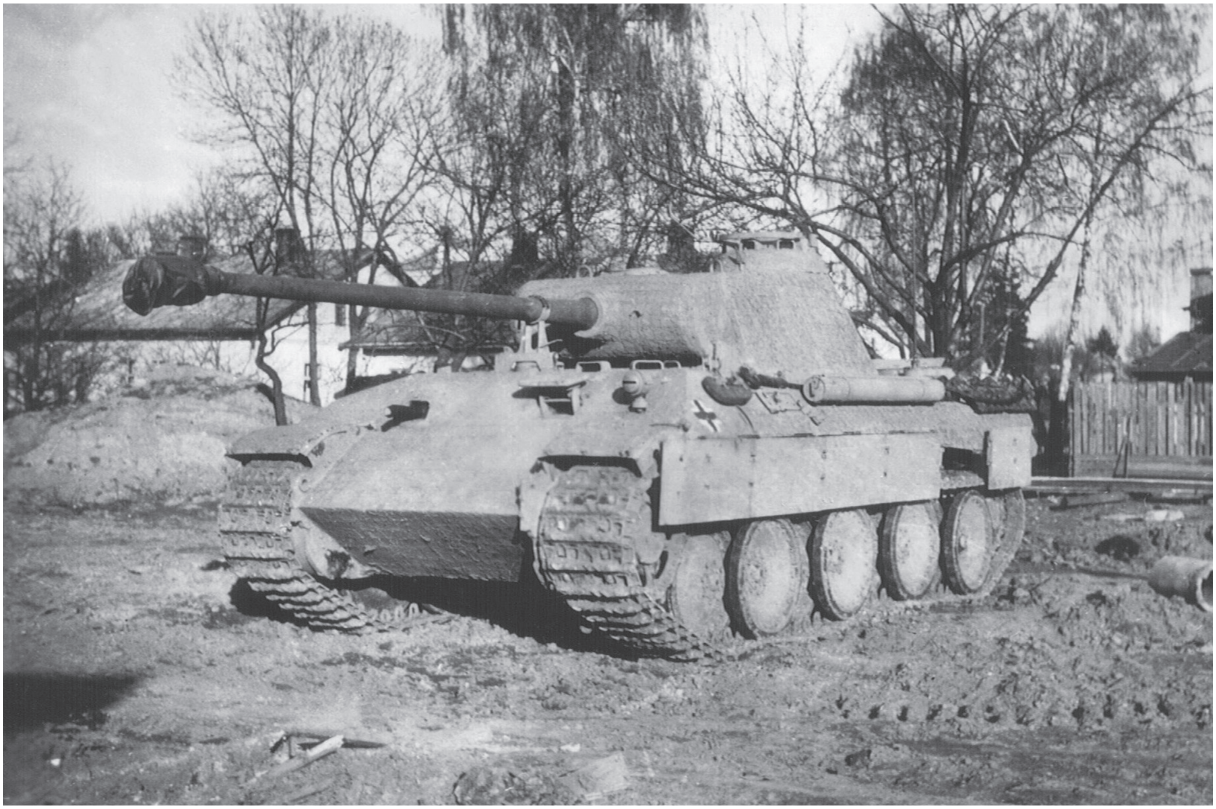
Weak areas:
The plug covering the port for the *Maschinenpistole* (MP) was blown into the turret by a hit (probably 4.5cm) killing the gunloader and commander: The taper must be strengthened. It is feared that PaK hits against the lower part of the mantlet are deflected down and through the roof into the fighting compartment. The strengthening of the roof armour must be investigated.

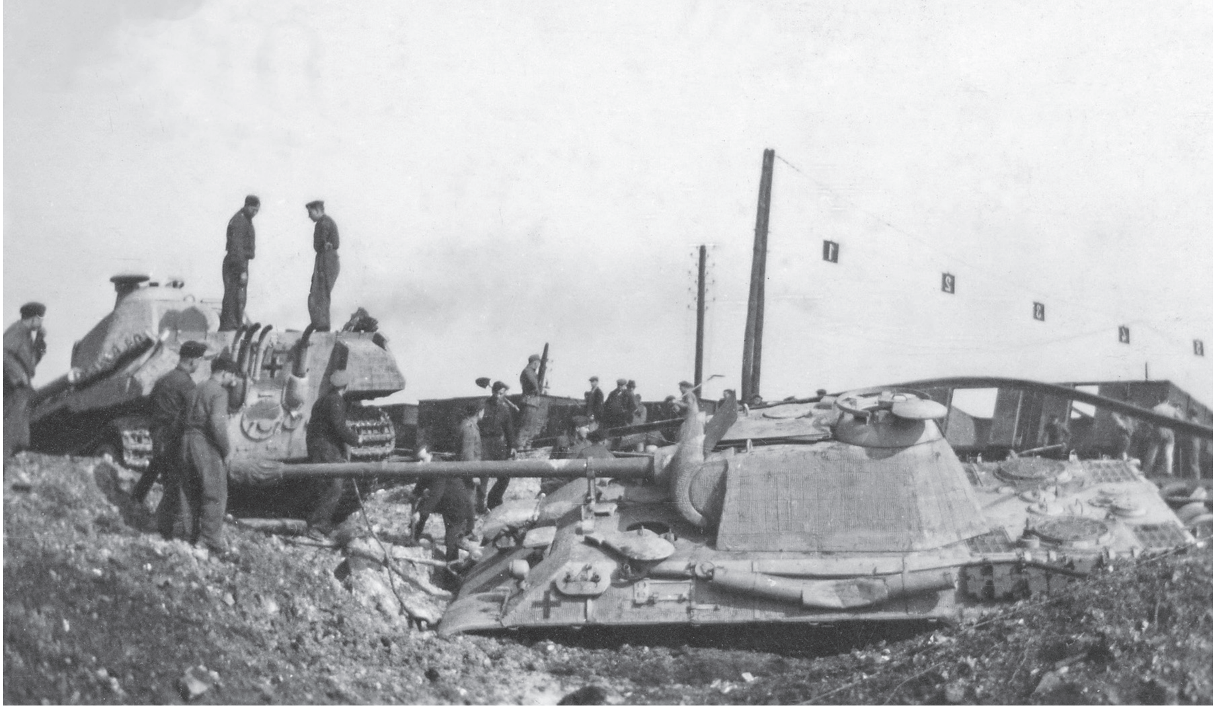
Effect of mines:
Some 40 Panthers were put out of action in the opening days through enemy

Right:
A well-camouflaged Panther hidden among trees due to the constant threat from enemy fighter bombers in the Italian theatre. The same threat forced the Germans to move their fighting vehicles, whenever possible, at night. (BA)

Below:
A PzKpfw V Panther Ausf A possibly photographed in the autumn of 1943. The vehicle has no tactical signs, no unit insignia or turret number; only a clear *Balkankreuz*. (Anderson)







A PzKpfw V Panther has slipped sideways into a crater left after Russian partisans had attempted to destroy a railway line. A recovery, using another Panther, is about to get underway. (Anderson)

mines. As a rule only four to six track segments and two to four running wheels were damaged. On some vehicles the swing arms of the suspension were bent. In rare cases damage was caused to the drive sprocket. In another case, the ammunition stored under the turntable was ignited by a spark. The Panther burnt out. Protection must be found to stop this occuring again.

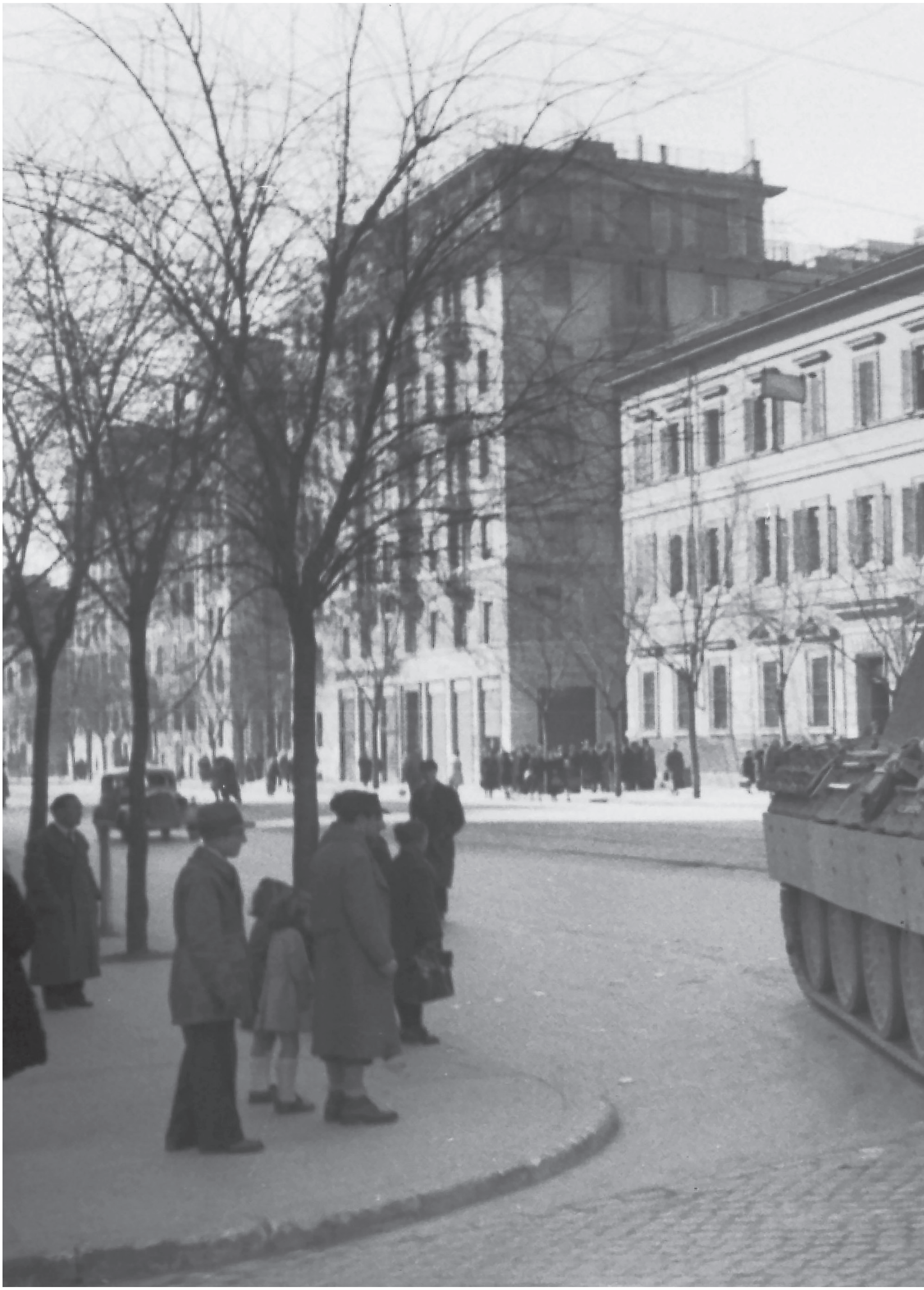
Conclusion: Work must proceed with some urgency to create a workable means of clearing mines or rendering them harmless.

The turret:
Difficulties occur when closing the commander's cupola when the vehicle is not level and also opening it when the vehicle is on fire. A better solution must be found in order to avoid fatalities. Also the hatches for the driver and wireless operator jammed in such a way that it was not possible for them escape.

The vision visors have in general remained sound. Only in one case was it reported that a visor had bent. Absolutely essential is a wiper for the sighting telescope; withdrawing this during action is too time consuming. The gear oil for the turret turning mechanism and also the lubricant for the turret telescopes must be improved.

Technical defects in the engine compartment:
Most mechanical failures result from a defective fuel pump (from PzAbt 52 to 8 July; 20 cases), presumably there is a problem with the material. When these pumps leak, fuel gathers in the sump in the floor of the vehicle; in three cases this has resulted in the total loss of the tank. The Panther bursts into flame particularly easily when not level. In most cases the fire in the engine bay was contained when the automatic fire-extinguisher activated.

A Panther of I./PzRgt 4 in Rome. After Italy surrendered to Allied forces on 8 September 1943, German troops became an occupying force in the north of the country until 29 April 1945. (BA).



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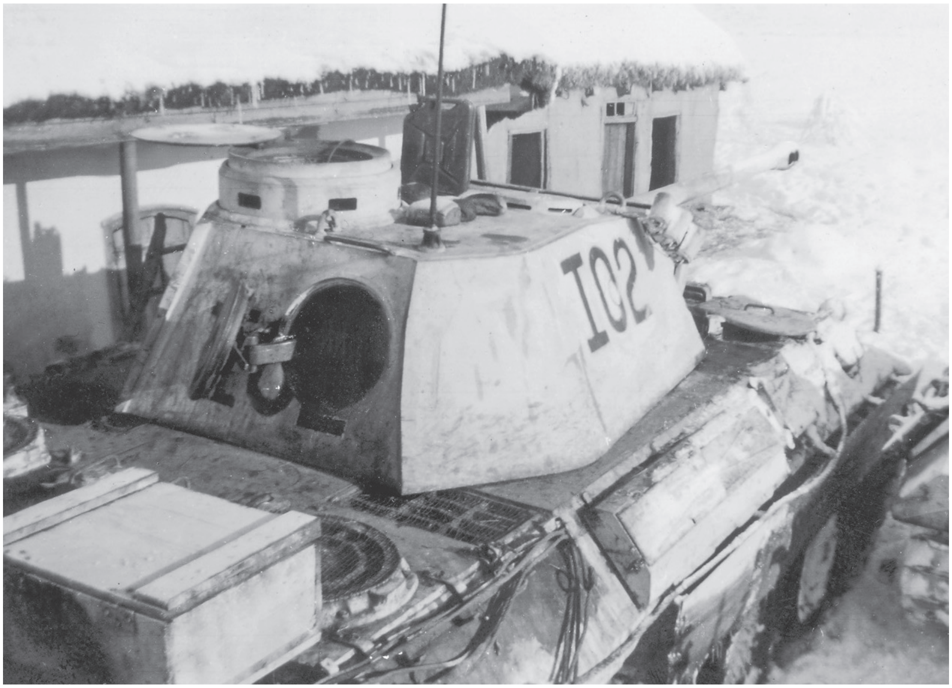


A *Panzerbefehlswagen* Ausf D the command vehicle of the battalion staff. An additional 2m *Sternantenne* (star aerial) has been mounted on the turret roof. The metal container on the right-hand side of the hull was fitted on only a few Panther Ausf Ds. (Wilhelm)

> Engine failures:
> At this time, the rate of engine breakdown is unacceptably large. Up to 8 July, 12 engines were reported as defective by PzAbt 52. After a number of days of operations the defects reduced, therefore it is being assumed that the engines had not been sufficiently run-in.
>
> Transmission:
> Serious problems have not occurred, the changes introduced at Grafenwöhr seem to have been successful. Up to 8 July only five transmission breakdowns were reported by PzAbt 52.
>
> Conclusion:
> The defects mentioned have been brought to the attention of the Reichminister for Armaments and Munitions and to the Weapons Office. Remedial measures have been promised.

Most of the mechanical problems described above were blamed on the Panther having entered series production too soon. Ultimately the type had not been trialled and tested before being delivered to forces on the battlefront. In the second half 1943, all the manufacturers were making an effort to fundamentally improve the Panther.

On 26 July 1943 a detailed report on the first engagement of the PzKpfw V Panther was sent to the tank officer at the Army General Staff.

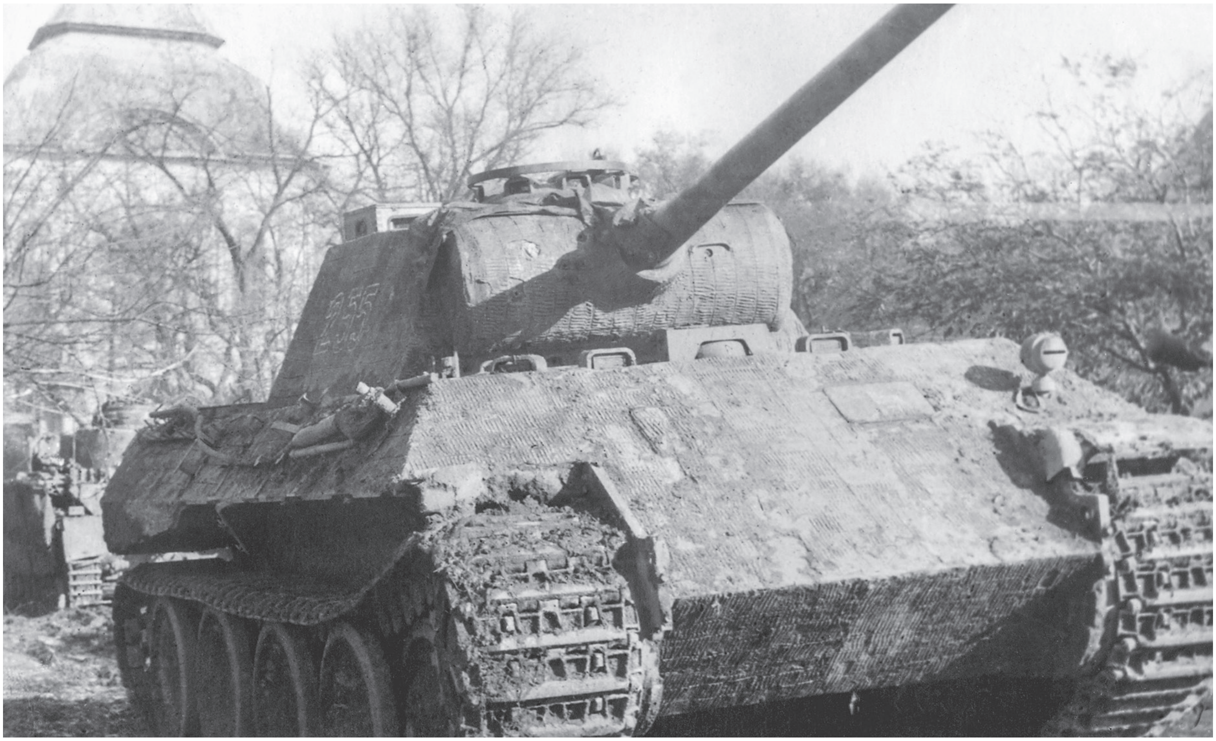
This led to a lengthy report by the Army General Staff:

I: *Panzerkampfwagen* V Panther
1.) Tactical experiences
Errors of leadership
a) Withdrawal of other artillery and infantry where Panther deployed
b) Poor cooperation with the artillery and infantry
c) Brigade staff were not effective due unacceptable personal differences

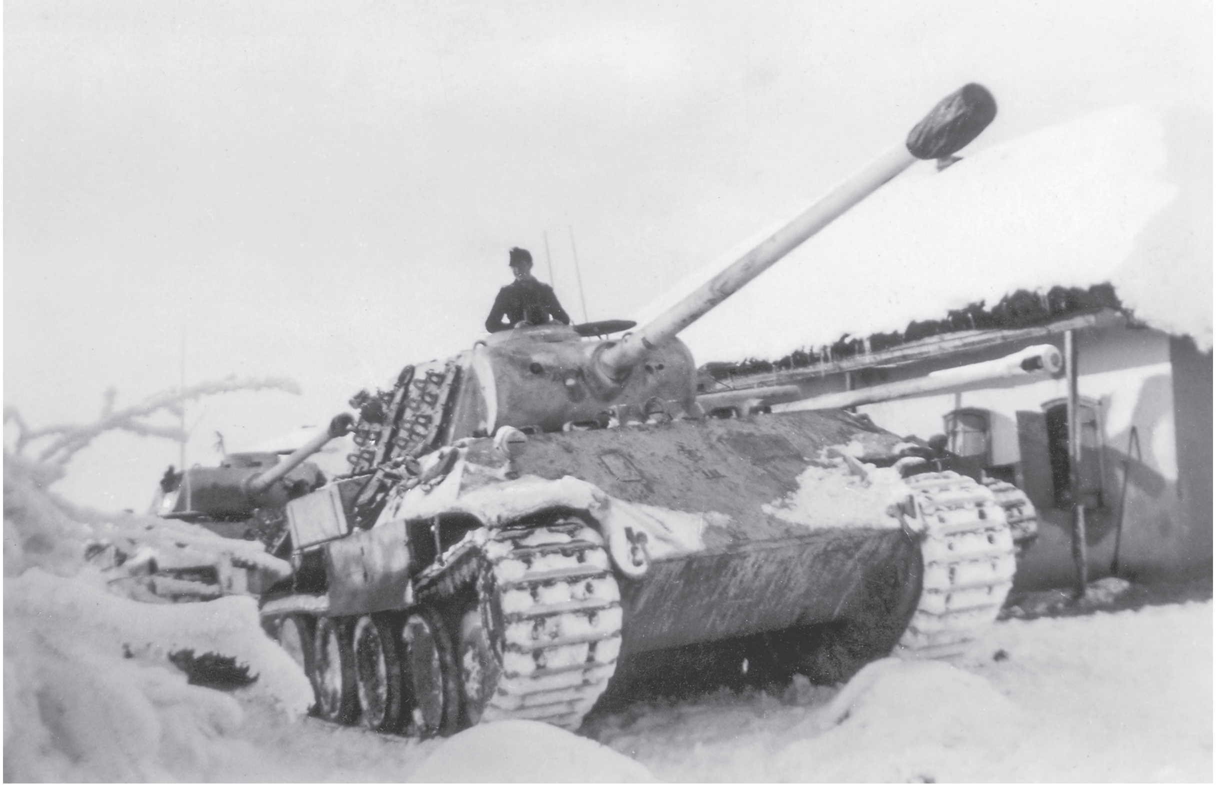
Conclusions:
a) Deploy the Panther at the focal point of an action, additionally all available infantry and artillery etc., are to support.
b) Means to protect the vulnerability of the Panther on the flanks.
c) Total cooperation
d) A wide front for the attack spearhead

The views of the tank officer
The requirement for cooperation with other branches of service should only happen after incorporating the Panther battalion back in their 'old' division.

2.) Organization
a) Combination of fighting squadrons is well tested (each company of four platoons with five Panthers each and two Panthers in the company troop.)
b) The number of wheeled vehicles can be reduced.

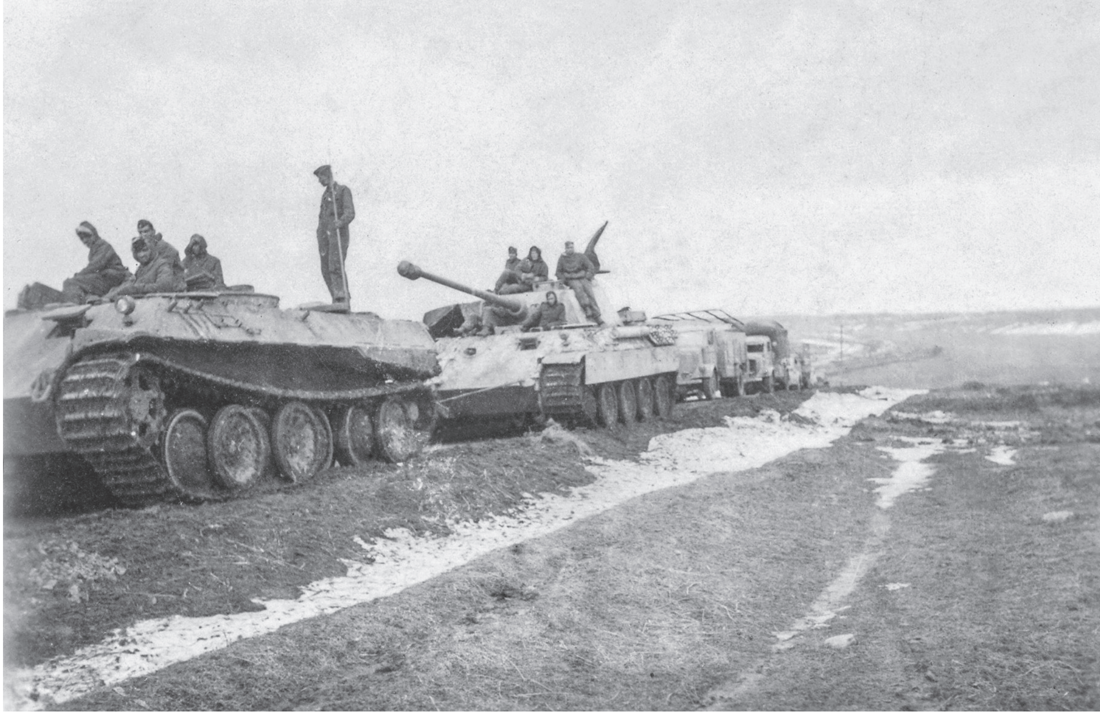


The PzKpfw V Panther Ausf A followed the Ausf D into production. The most significant change was to the turret, which was fitted with a much-improved cupola. As production progressed, the slit-type port for the hull MG was also changed. (Hoppe)



Above:
No attempt has been made to camouflage these Panthers in the winter of 1943. Unlike other types, the Panther was little troubled by the conditions. (Wilhelm)

Right:
Moving an immobilized Panther was often a major problem for a recovery unit. Here a Panther tank recovery hull – note it has lost a roadwheel – is towing a Panther A at the head of a column of soft-skinned vehicles. (Anderson)



3. Training
a) State of training poor. During training phase conversion to the Panther is essential. Training on other types is of no value.
b) Large part of losses result from poor training.
View of the tank officer
More time for training

4.) Technical matters
a) The main gun is good, observation is made difficult after a few rounds by smoke from the breech
b) Side vulnerability (40mm armour)
c) Turret hatch jamming (impossible to get out during fire)
d) Fuel pumps work poorly. Fuel and oil settle in the bottom of the engine bay leaving a flammable mix: after the hull was hit the Panther burnt out.
e) Exhaust and engine fumes in the fighting compartment due to the engine bay being sealed against water ingress
View of the tank officer
Improve the fuel pump, abandon amphibious capability.

IV: Comprehensive report by *Oberstleutnant* Reinhold regarding technical problems of the PzKpfw V… presented separately.

Reinhold submitted this concluding report on 26 July 1943:

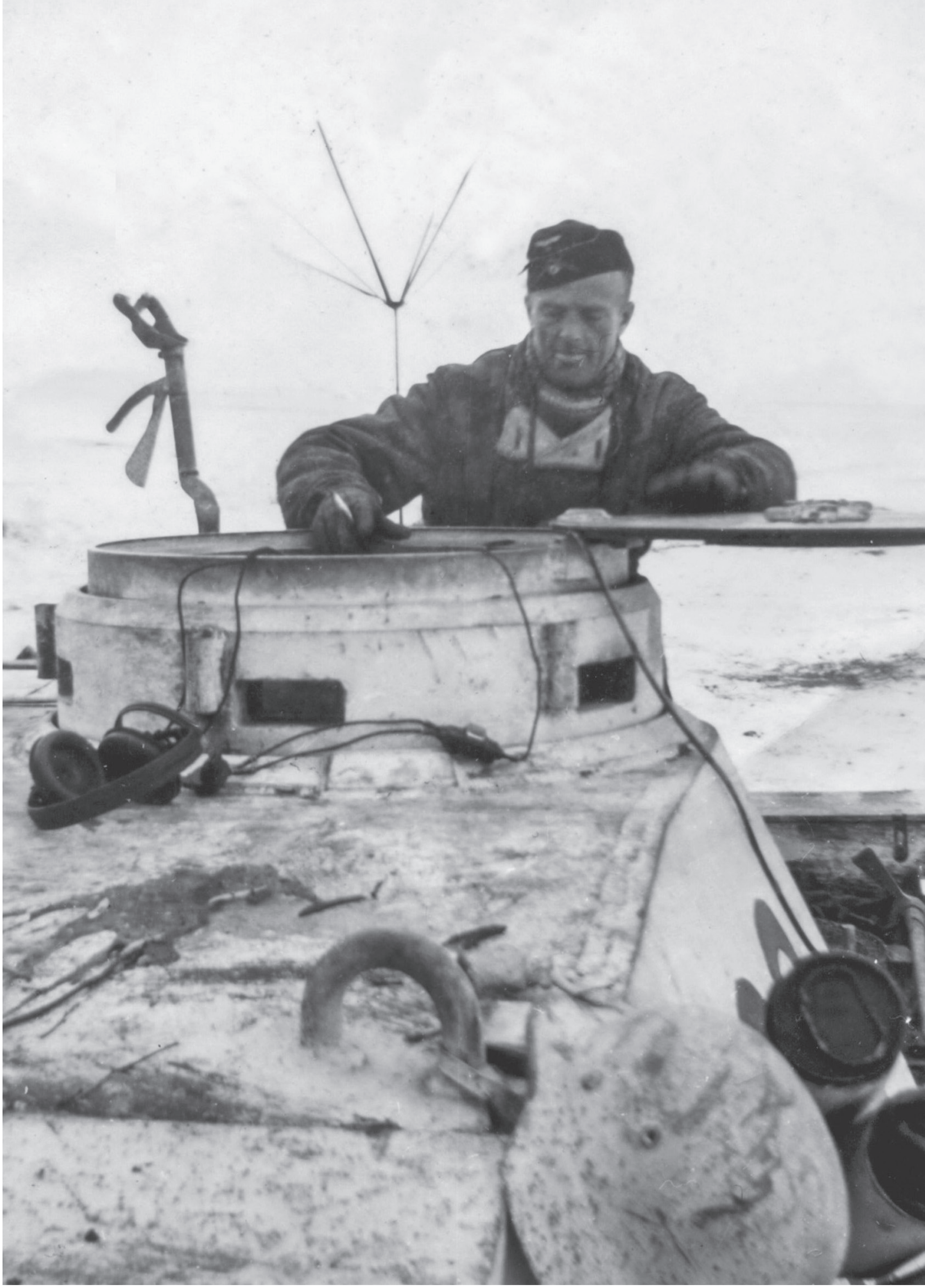
I: Combat value PzKpfw V (Panther)
No objection to the weapon, no real complaints. Frequently achieved hits on T-34 tanks at over 3,000m range.

High number of Panthers becoming unserviceable due to:
1.) Hits
Frontal armour adequate but not the side armour, easily penetrated. For that reason there are very frequent write-offs because the vehicle burns out due to ammunition or fuel igniting.

Also the roof armour is too weak. Shells which hit the gun mantlet often ricochet downwards and go through the roof armour; driver and radio operator casualties.
Reinforcement of the armour is not possible because running gear cannot take heavier weight.

2.) Mechanical failures
a) Engine damage. Cause is not yet certain, presumably the result of a too short running-in period and untrained driver. Engines overstressed and overheat, causing connecting rods to break.
b) Fuel supply pump. In many cases supply stopped due to leakage caused by defective gaskets.
c) Fuel and oil-line connections leaking, therefore increasing the risk of fire.

The commander's cupola on a Panther *Panzerbefehlswagen* is fitted with the early type of anti-aircraft mounting, soon to be replaced by an improved version. The *Sternantenne* 'D' was fitted for the long-range Fu 8 radio equipment. The commander has placed his throat-type microphone and earphones in front of the cupola. (Anderson)



3.) Mine Damage
Damage to tracks and suspension.
Serious consequences resulted, especially for driver and radio operator due to the new design of hatch lid. The lid jammed under fire, and was impossible to open. Outcome: Tank on fire, in many cases the driver and radio operator could not get out. Therefore in action, they do not shut the hatch lid preferring less protection and being able to get out quickly.

Report by the battalion engineer dated, 19 July 1943:

As a result of the sudden order to retreat, any remaining immobilized Panthers must be abandoned. The following vehicles are to be blown-up:

Rgt squadron	Three Panthers
Abt 51	29 Panthers; perhaps nine are suitable for repair
Abt 52	24 Panthers
Total:	56 Panthers including those 40 reported as write-offs

Abt 51, situation report as at 16:00hr, 18 July 1943:

Operational	33
Under repair at I-services	32
Total losses	31 (Two gutted by fire, 29 blown up)

Abt 52

Operational	28
Under repair at I-services	40
To Germany for repair	Four
Total losses	24 (blown up)

The repairs service of the two PzAbt work very well. Some 25 repairs were achieved daily. Because of the large number of repairs and shortage of spare parts, supply by air transport, especially engines and fuel pumps, has helped significantly. The spare parts situation is now improving with arrival of *Blitz-Pfeil* (lightning arrow) transports so that most repairs to damaged tanks at I-services can be reckoned as short-term.

Memorandum on the PzKpfw V Panther
In August 1943 the PzBrig staff identified ten basic tactical principles for the PzKpfw Panther:

1.) The Panther is not invulnerable. Flanks and rear are penetrated by fire from enemy 7.62cm anti-tank and tank guns.
2.) Protection of Panther flanks is always important. (Always make smoke)
3.) The Panther cannot drive across a minefield and expect no damage. Setting off mines renders it immobile, if even only for a short time.
4.) The great firepower of the Panther must not lead to an increase in distances and spaces in the platoon. In some circumstances this will complicate mutual support.

5.) The great effectiveness of the gun makes it possible to exchange of fire with enemy tanks at long range. A KV-1 can be destroyed at 3,400m, a T-34 at 1,500 to 2,000m.

6.) Battlefield and terrain reconnaissance are especially important. An attack should never be made without reconnaissance first. This must be frequently done by the crews on foot. (Covering fire must be provided)

7.) Even the Panther may alternate between receiving fire and moving. Rapid advances should be kept short to prevent the unit breaking up.

8.) If tanks are fighting alongside PzKpfw III and IV (e.g. breaking through enemy position) it is recommended to place the Panther with the long range at the front and the PzKpfw III and IV initially positioned so that they can protect the flanks or are also available to set off 'in pursuit' after the breakthrough. (PzKpfw III and IV – less weight, less fuel consumption).

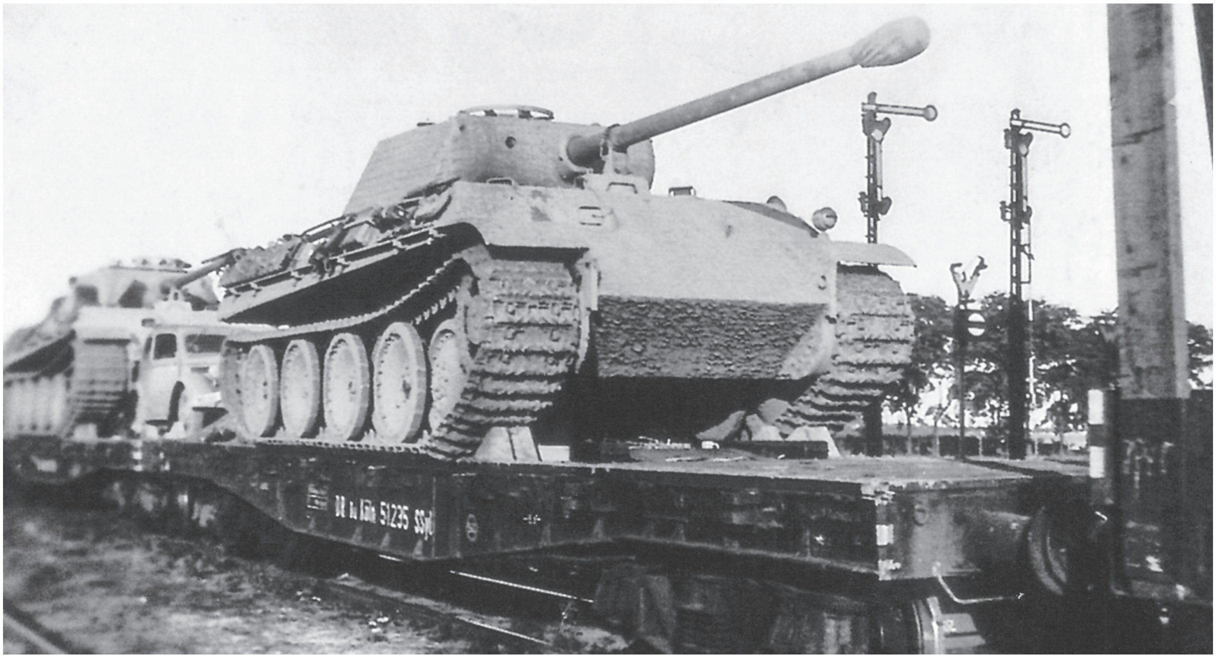
9.) Panthers are less suitable for fighting in woodland than the PzKpfw III and IV. Ideally, they lead the fighting around villages from monitoring positions or enter large villages with grenadiers.

10.) The Panther is less suitable than the PzKpfw III and IV and self-propelled assault guns to support Panzer-grenadiers in mopping-up operations.

11.) The aim must always be to obtain a secure position at night for the Panthers, from where they can be easily moved out and moved.

12.) The heavy fuel consumption requires that before every operation the question must be asked as to whether it is worth the expenditure of fuel. (Panthers need double the fuel of the equivalent PzKpfw III, IV and StuG.)

Young Panzer grenadiers in conversation with the radio operator and driver of a PzKpfw V Panther. Both the troops and the tank are well camouflaged. (Anderson)

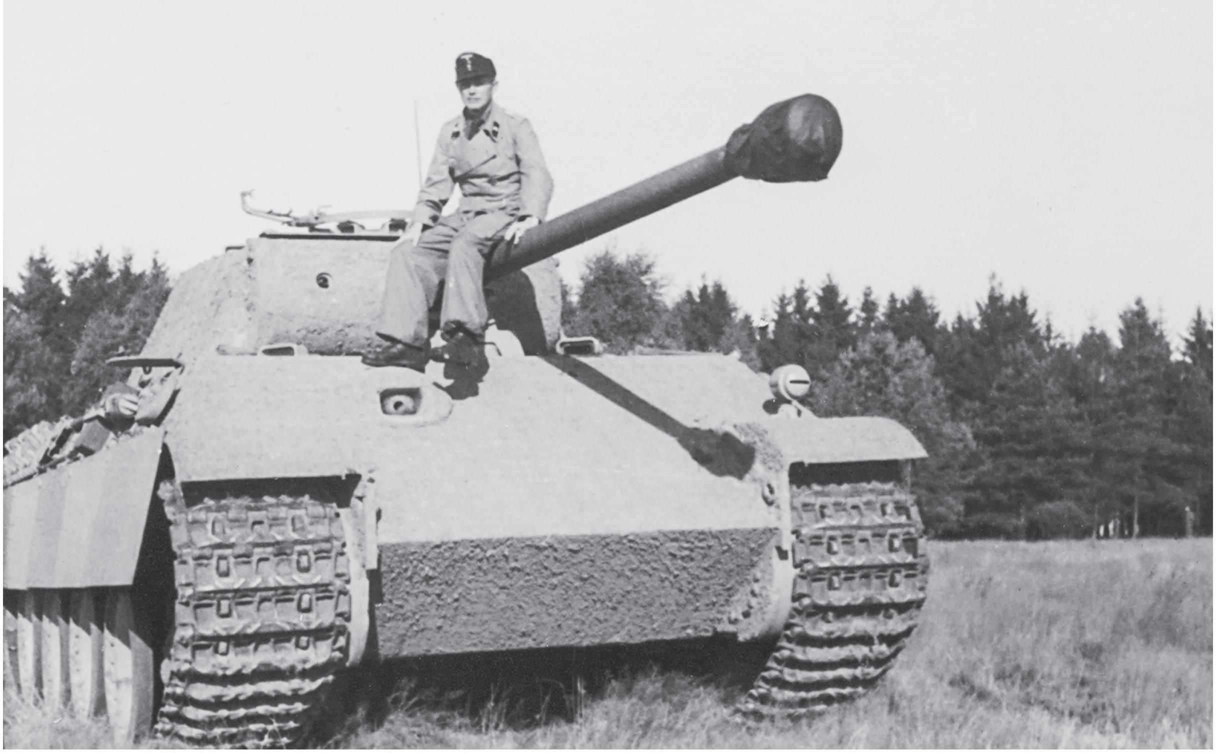


A new or refurbished PzKpfw V Panther Ausf G, loaded on a SSyms waggon for delivery to forces defending the western border of Germany. It was common practice to transport tanks by rail, even for short distances. Railway tracks, junctions and bridges were regularly targeted by enemy fighter bombers or attacked by partisans. From September 1944, Zimmerit was no longer being applied to production tanks. (Anderson)

> 13.) Economy with ammunition is especially important. Therefore gunnery training is vital.
> 14.) A Panther towing away an immobilized Panther is only permitted if the latter is receiving enemy fire in the field. A Panther requires five 18t towing tractors in open terrain, and two or three on hard-surfaced roads.
> 15.) Repairs by the workshop must be so arranged that as far as possible heavy spare parts can be brought up to the workshop location by rail.
> 16.) The Panther should only be used in conjunction with Panzer-grenadiers who have been trained to fight alongside tanks.

Reports from the front line often provided a mixed picture. In October/November 1943, the SS-PzDiv Leibstandarte Adolf Hitler received a total of 96 Panthers. On 16 November 1943, the unit submitted a situation report which gives a good idea of the average operational readiness. After one week of operations, the stock of battleworthy Panthers had shrunk by some 65 percent.

> Panther Abt Kuhlmann was unloaded between 7 and 8 November 1943 in the Shitomir-Berditschev-Kasatin area and on the orders of the general command of XXXXVIII PzKorps assembled on the night of 9 November in the area east of Berditschev. On 8 November 1943, the battalion was ordered to advance. Armoured thrusts were performed along the railway line from Kasatim-Koshanka to Fastov.
> Therefore in six days Panther Abt Kuhlmann, without any possibility of repairs, knocked out a total of 40 enemy tanks in continuous combat and covered 210km on the map.
> The Panther is considered by the whole battalion to be an outstanding tank.



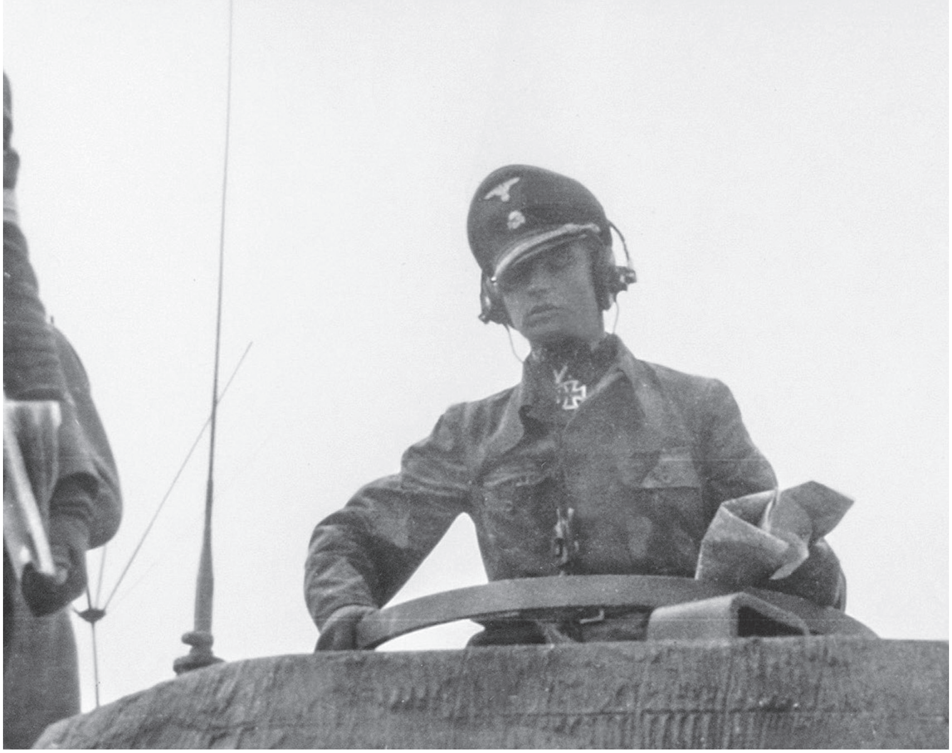
A newly delivered Panther Ausf A or D. The driver's vision port has been deleted and the MG firing port has been changed to a ball-type mounting. When closed down for action the driver steered the tank by using an episcopic vision device. (Anderson)

Tank Strength West, 1 June 1944 (selected units)

Unit Type	21.PzDiv	12.SS PzDiv Hitlerjugend	PzLehr Div	17.SS PzDiv GVB	s SS PzAbt 101
Sturmgeschütz	10		9	42	
PzKpfw III & IV L/24	25	4			
PzKpfw IV L/48	96	101	101		
PzKpfw Panther	81	89			
PzKpfw Tiger E		3			45

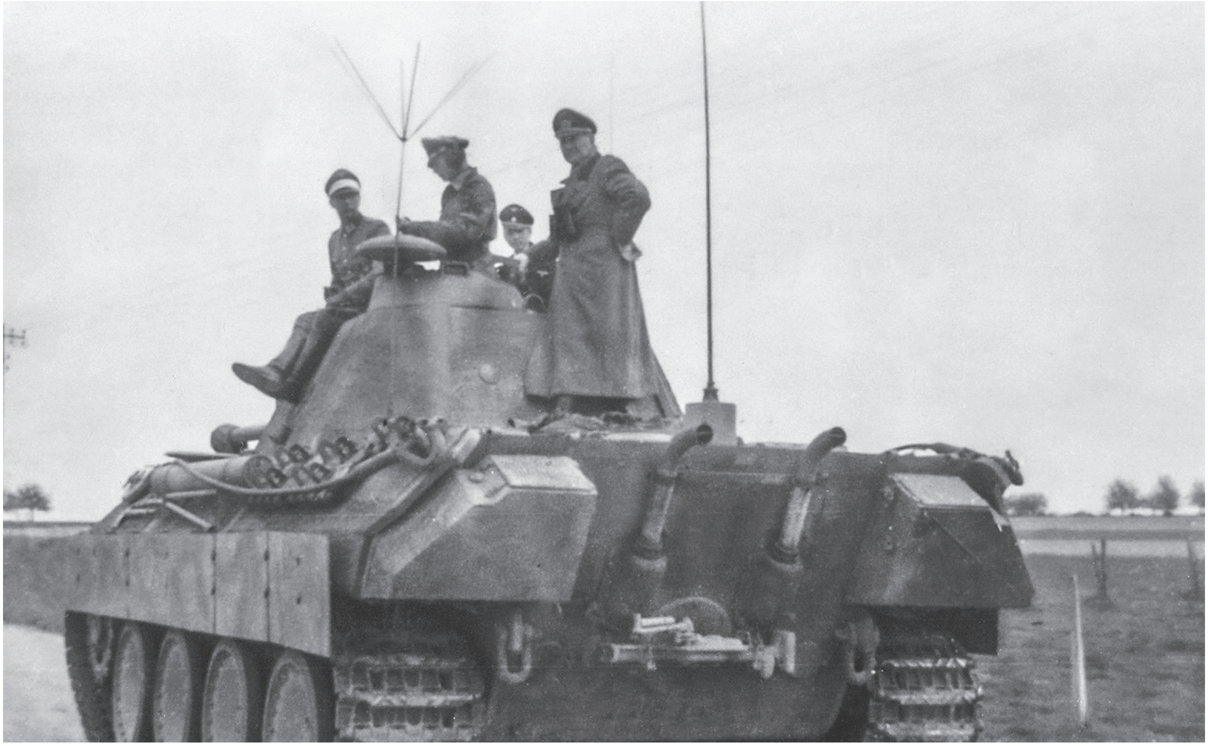
List of Tanks Seriously Damaged/Destroyed, 3 July 1944 (selected units)

Total damaged or destroyed	537					
Distributed into units in the field		17.SS PzDiv	2.PzDiv	PzLehr Div	12.SS PzDiv	21.PzDiv
Enemy tank	227	x	x	85	105	37
Enemy tank hunter, anti-tank gun on tank chassis, assault gun	61	7	15	18	x	15
Anti-tank or AA motorized platoon/towing vehicle	105	5	4	7	16	41
Artillery	36	x	x	4	x	3
Close-combat weapons	108	5	5	40	23	5



Left:
A propaganda photograph of a young SS company commander in the cupola of his PzKpfw V Panther. A 1.4m *Stabantenne* (rod aerial) is fitted, but according to regulations a 2m rod aerial could also be used. (NARA)

Below:
A *Panzerbefehlswagen* Panther from 12-SS PzDiv. The *Sternantenne* (star aerial), for the Fu-8 radio, was normally mounted on a porcelain isolator protected against enemy fire by an armoured pot, but here the aerial is fitted to the normal aerial foot. (NARA)



A well-camouflaged Panther Ausf G being driven through a village in the Lorraine region of France. The driver (and radio operator) has raised his seat, so that his head is out of the exit hatch, to have a better view of the road ahead. (NARA)

> Inventory of defects:
> Seven total losses by hits to the flanks and rear, four drive shafts damaged, 38 engines damaged, one sprocket, five final-drive units, one magneto, one set of running gear, one ventilator motor, one turret turning mechanism and one oil cooler.
> Under repair: 22 Panthers more than six days, 32 less than six days.
> Panthers operational on 14 November 1943; 35.
> For the attack on Solovyevka on 15 November 1943, five total loss to enemy fire (not yet confirmed), and nine currently with mechanical damage.

Some of those non-operational tanks returned to duty after being successfully repaired. A much-repeated complaint was that many Panthers which had become immobilized (mined) with minor damage to the running gear had to be blown up due to a lack of fuel or because there were no suitable recovery vehicles available.

The operational story of the Panther began under unfavourable conditions, the one-year development schedule proved much too short, and Hitler's decision 'to test new weapons systems at the front' was more than reckless. Wherever the Panther could use its powerful and accurate gun (even under the difficult conditions), the operation was successful if the tank was deployed using proven German tactics.

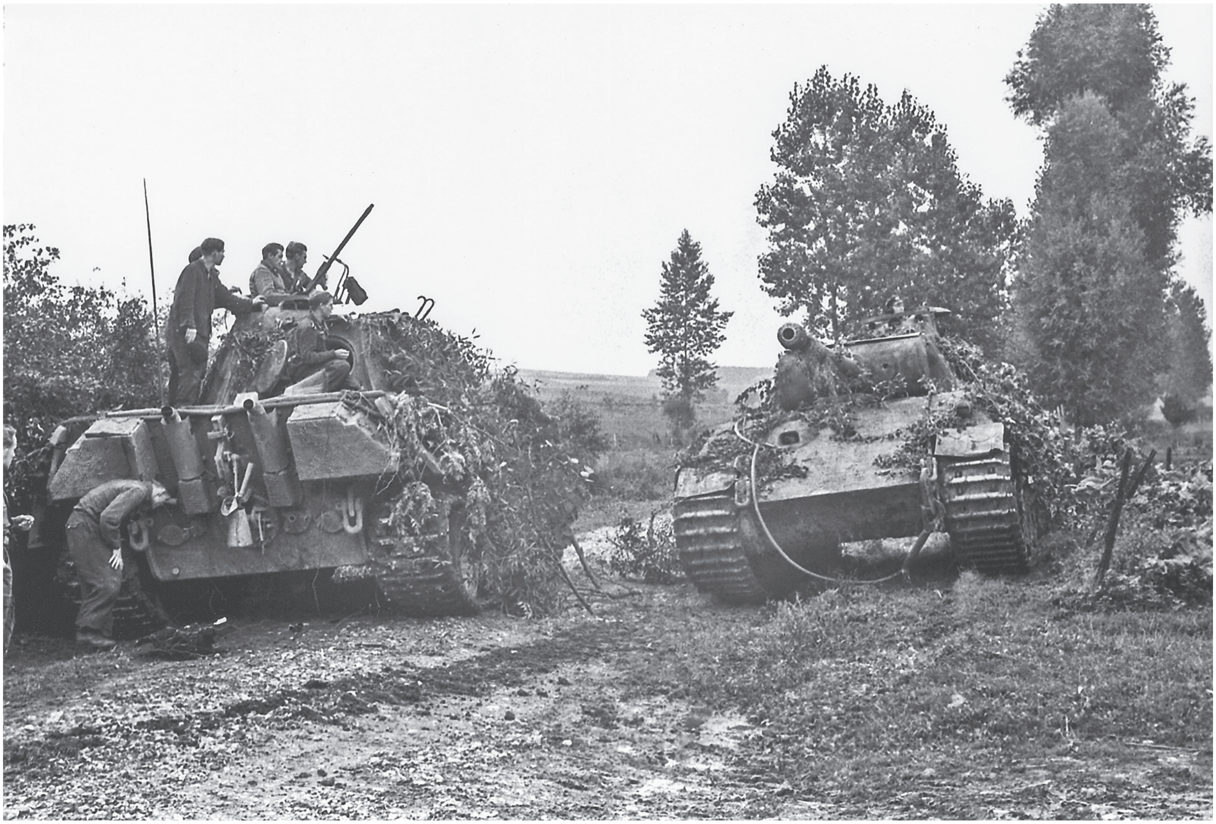
Deployment in Italy

After the Allied landings in July 1943, German forces began a slow retreat to the north. On reaching the Gustav Line, a well-developed defensive barrier 100km south of Rome, they dug in and halted the Allied advance for the first time.

In February 1944, PzRgt 69 was transferred to Italy in order to engage and obliterate the Allied bridgehead at Anzio (some 50km south of Rome).The regiment had a complement of 11 Elefant heavy anti-tank/assault guns (1./s PzJgAbt 653), 45 Tigers (s PzAbt 508), 57 assault tanks (StuPzAbt 216) and 30 self-propelled assault guns (PzAbt *Funklenk* 301 [Fkl – radio-controlled demolition charge carrier]) and I.Abt/PzRgt 4 with 76 Panthers.

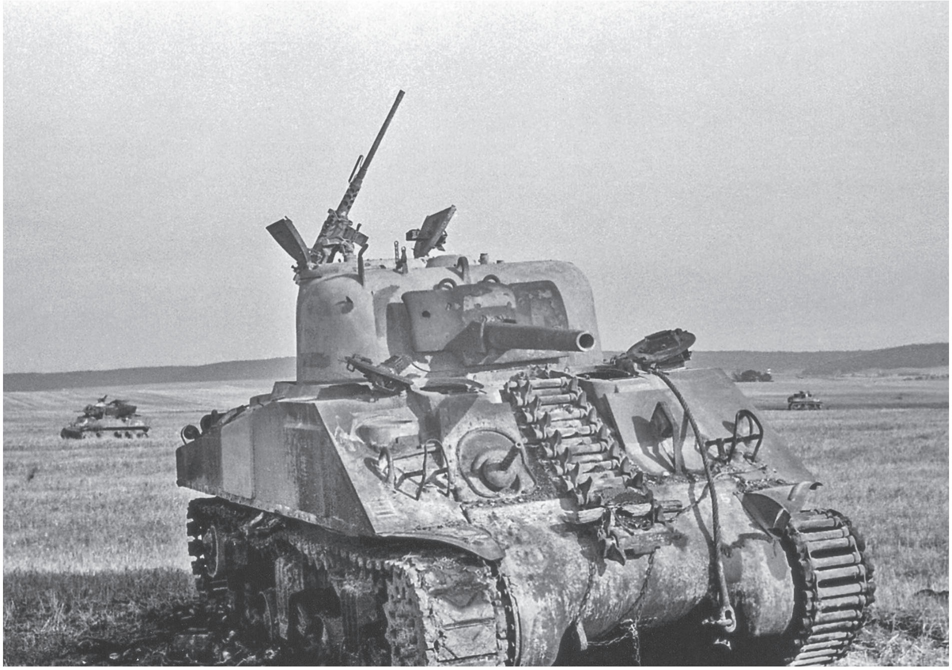
The decision to transfer heavy and medium tanks such as the Panther to Italy was problematic due to the topography of the country. The Appenine Mountains form the 1,500km long 'backbone' of of the country, and much of it has roads that are steep, narrow and twisting, anything but suitable for tracked vehicles. The southern coastal regions had large areas of marsh; some parts had been drained to make them fit for farming. Therefore many parts of

The battlefields of Normandy were treacherous and not ideal for tank operations. A Panther halts at the edge of a harvested cornfield, ideal cover for bazooka-armed enemy anti-tank teams. In such circumstances, it was important for tanks to keep in close contact with Panzergrenadiers. (Hoppe)



Above:
The Panther to the left has been immobilized and the crew has covered it with foliage against air attack: note an anti-aircraft MG is mounted and ready to fire. The other Panther has a towing cable in place ready for the recovery. (NARA)

Right:
This M4 Sherman was knocked out during tank-versus-tank combat in the Lorraine region of France during summer, 1944. Although better armoured and highly manoeuvrable, the US-built tank did not have the firepower to defeat a Panther or Tiger. (NARA)



the country were not suitable for armoured warfare. On 30 May 1943 during a Führer conference it was decided:

> The Führer was made aware that the Panther is still suffering from 'teething troubles' such as are to be found on all other tanks in their early stages. It is therefore not advisable to deploy these vehicles in the southeast (Greece) because damage occurring there cannot be repaired as quickly as in front areas nearer to Germany. It is also feared that the great width and weight of the vehicles would be too much for the narrow mountain roads and bridges.
>
> The Führer is in agreement and has decided that in the southeast instead [of those vehicles] the PzKpfw IV should be deployed.

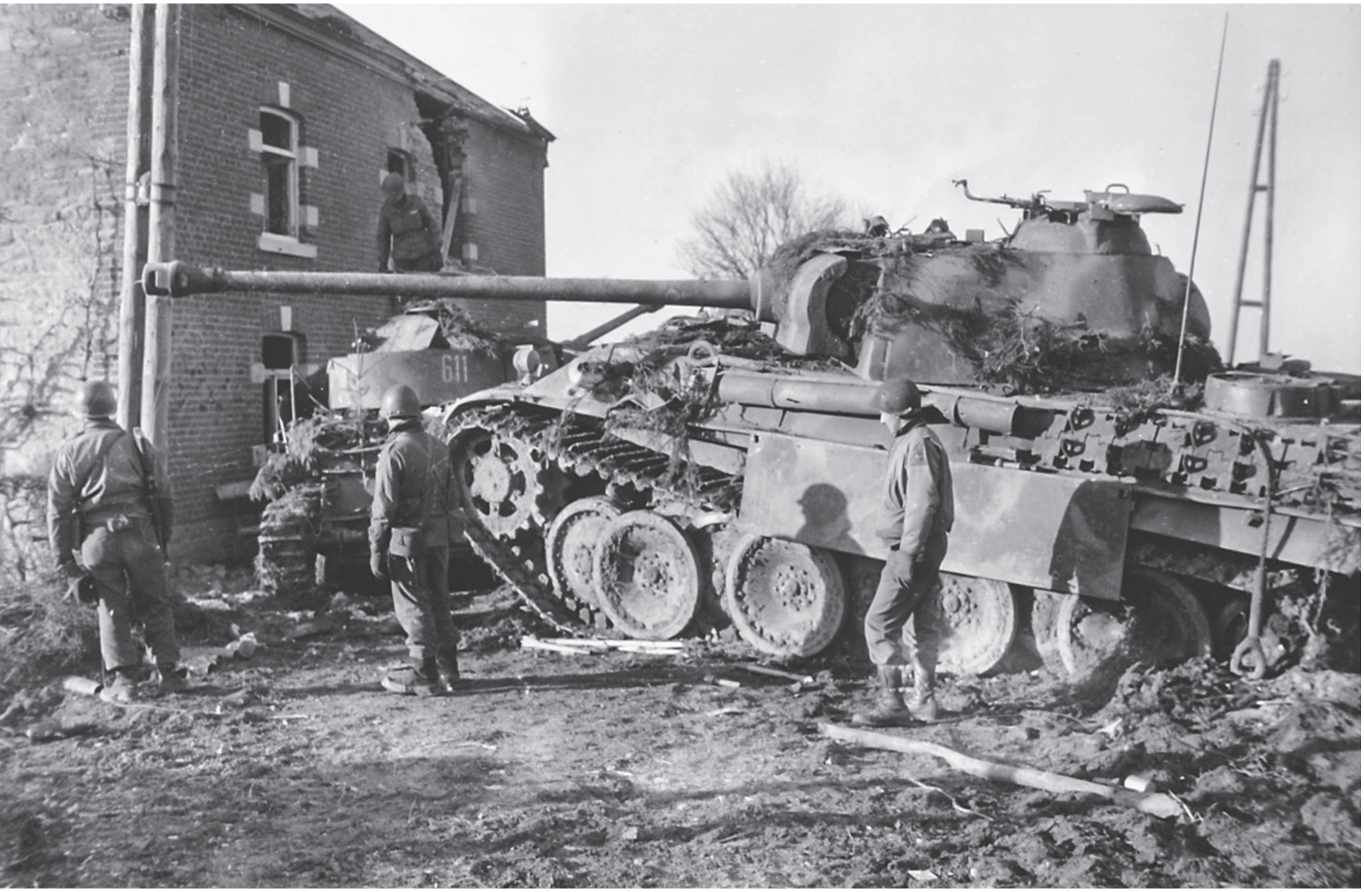
The Italian terrain was basically similar to that of the Balkan States. On paper PzRgt 69 appeared extremely powerful, but under the special circumstances of the Italian theatre of war its deployment promised little hope of success. The heavy Panthers and even the lighter self-propelled assault guns were mechanically compromised during the march over mountain roads. Damage to the drive units and brakes led to numerous breakdowns. Repairs to damaged vehicles wasted time and recovery was often not possible and the approach roads became blocked. Once in the battle area, deep mud awaited the German tanks. While US troops could carefully select where to dig in near the bridgehead and had the use of the few paved roads, the opportunities to attack even on these roads was very limited. Enemy air superiority and heavy naval guns from the invasion fleet prevented the bridgehead from being destroyed.

The crew of a German tank examine the effect of the fire from their gun on a US-built M4A3 Sherman tank. (NARA)

Two Panthers of the Panzer Lehr Division have been destroyed possibly by rocket-firing Allied aircraft. An SdKfz 251 *Schützenpanzerwagen* (SPW – armoured personnel carrier) has also been ripped apart in the attack. (NARA)

An entry in the war diary of I./PzRgt 4 exposed the magnitude of the problem. Within four weeks, from mid-May to mid-June 1944, the number of operational Panthers fell from 64 to 11, levelling out at an average of 18 vehicles for the rest of the year. In his situation report for April 1944 the commanding officer stated:

> Material situation:
> 64 Panthers… operational. Four Panthers undergoing short-term repair (up to three weeks), two Panthers… under long-term repair (over three weeks).
> Short value assessment by the commanding officer:
> 1.) State of training: Technical personnel and drivers very good: commanders and gunlayers lack practical experience. Training is being continued where tactical requirements allow.
> 3.) Special difficulties: Final-drive units now as before suffer the greatest wear and tear, and spare parts are always required. The small storage space we have has to be carefully utilized. The heavy wear and tear on the tyres of running wheels bears no comparison to our previous allocation.
> 4.) Degree of mobility: tank parts 80 percent, wheel parts 88 percent.

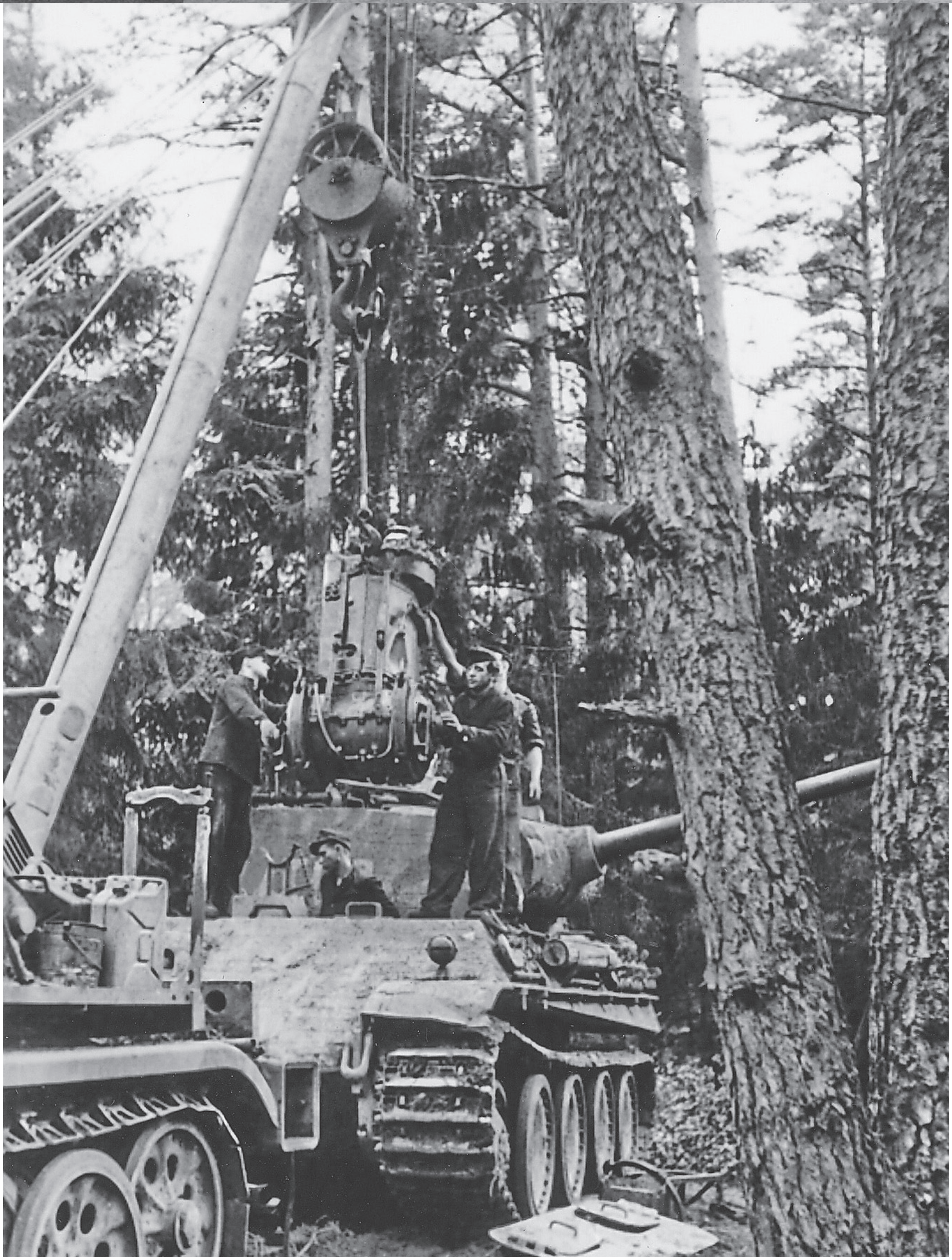


US Army field engineers prepare to recover a Panther Ausf G: note the thicker gun mantlet and the lack of Zimmerit. Towards the end of the war, coordinated counterattacks by German forces were no longer possible to mount; while at the same time the quality of enemy anti-tank weapons had markedly improved. (NARA).

A month later these circumstances had changed:

> Material situation:
> Six Panthers… operational. 13 Panthers under long-term repair (over three weeks)
> Short value assessment by the commanding officer:
> 1.) State of training: Good.
> 3.) Special difficulties: Fighting power, i.e. number of available tanks down to under 25 percent. Recovery vehicles; insufficient numbers for the demand. Same situation as in previous offensives and withdrawals.
> Main replacement parts for PzKpfw V must also be supplied without first having to return the old part or else rapid repairs and, depending on circumstances, the recovery of a tank itself will be placed in doubt.
> 4.) Degree of mobility: Tank parts 8 percent, wheel parts 76 percent.

This shows that the conventional situation of the Panzer divisions in Italy had been set within much narrower limits. The German tank units were now forced to set up mixed fighting groups to act as 'fire brigades' rushing from one hotspot to another and perform a holding operation. German forces were



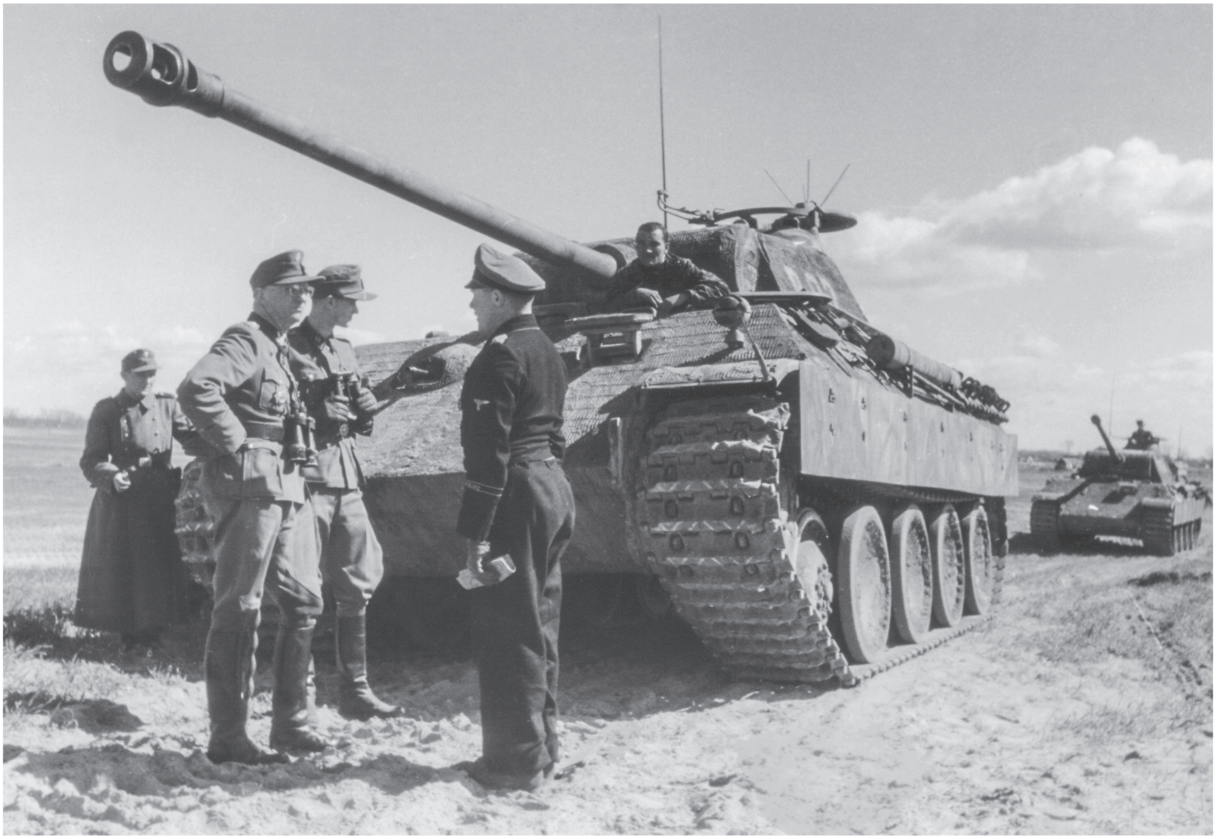
too weak for any decisive counterattacks, and the lack of air cover made the situation even worse.

On 24 February 1944 *Oberstleutnant* Rohrbeck wrote a report for the *Oberkommando der Wehrmacht* (OKW) on his journey to the Italian theatre of war:

> Enemy air force:
> The enemy dominates the air with his fighter-bombers, bomber formations and artillery spotters. Enemy fighters were not seen. Because of this, tactical movements and supply runs on the large scale are only possible by night.
>
> Our own tanks, self-propelled artillery and special vehicles
> The terrain south of Aprilia is not suitable for tanks; the approach roads are covered in stones and loose scree which leads to very high level of damage, tanks are strewn everywhere with damage to tracks, brakes and transmissions. Ahead hardly a tank is to be seen and if one does appear then very soon it will be attacked and destroyed (opinion of divisional commanders).
> Example: Of five Panthers in action on 17 February in the 3.PzGrenDiv sector, after three hours four had been destroyed or immobilized.

Opposite:
Hidden among trees, engineers remove the gearbox on a Panther Ausf G. The turret has been rotated to the nine o'clock position and the cover plate over the driver's position has been removed. The damaged component is being lifted by an SdKfz 9/1 swing-crane vehicle. (Anderson)

Below:
An adjutant issuing instructions in front of his *Panzerbefehlswagen*, turret number R02. The vehicle has a 2m rod aerial on the turret and a *Sternantenne* mounted on the engine deck. (Anderson).



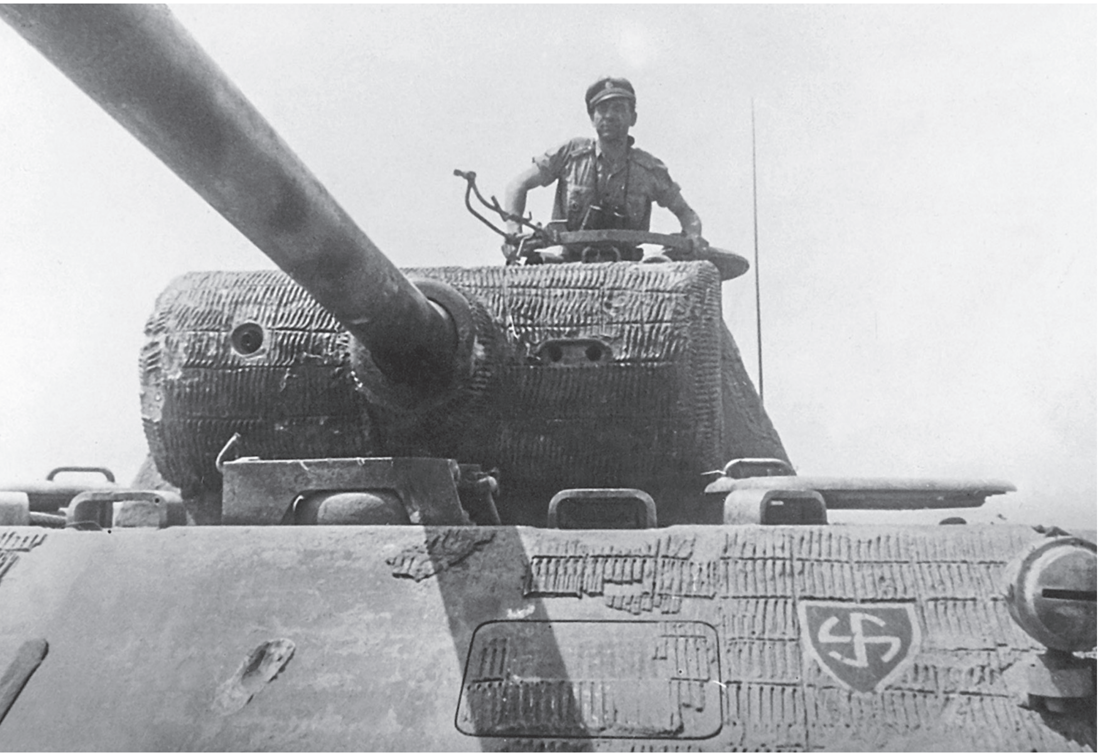
Panzer-grenadiers worked in close cooperation with the tank force. They were provided with SdKfz 251 armoured half-track vehicles and although these had thin armour, it did protect those inside against rifle fire and shell fragments. On the battlefield the Panther fought the enemy, and the grenadiers were tasked with protecting the tank against enemy anti-tank teams. (Anderson).

In November 1944, *Reichsminister* Albert Speer also made a journey to Italy, and wrote a report:

> On the south-west front the Sherman tank and its cross-country capability are praised. The Sherman climbs slopes which our tank crews consider to be insurmountable. This is achieved by the especially powerful engine of the Sherman for its weight. Also according to reports of 26.PzDiv its cross-country performance on the flat is completely superior to our tanks. The Sherman tanks drive cross country while our tanks have to keep to tracks and narrow roads which limits them greatly.
>
> All tank crews want to have lighter tanks which are more nimble, have improved cross-country mobility and the necessary fighting strength provided by a superior gun.
>
> In this situation the troops are of one voice in pleading for a reduction in armour in order to increase the total number of tanks being manufactured.

This report leaves nothing to be desired in clarity. At the time II Abt/26. PzDiv had some 80 PzKpfw IV and I.Abt (Panther) was attached to PzGrenDiv Grossdeutschland.

The fighting in Italy, highlighted the limits of German tank tactics. The Panzer and Panzergrenadier divisions lacked suitable tanks and the *Luftwaffe* was powerless because of Allied supremacy.



A PzKpfw V Panther Ausf A from 5.SS-PzDiv Wiking: note the unit's emblem painted on the glacis plate. A hit from what appears to be a small-calibre weapon has bounced off, leaving only a shallow a groove and an area of Zimmerit missing. (Anderson)

The Eastern Front

Following the failure of Operation Citadel, the Red Army finally took the initiative. Although Soviet losses were far higher than those of the Germans, nevertheless a gradual improvement in the tactical abilities of the Red Army were being observed.

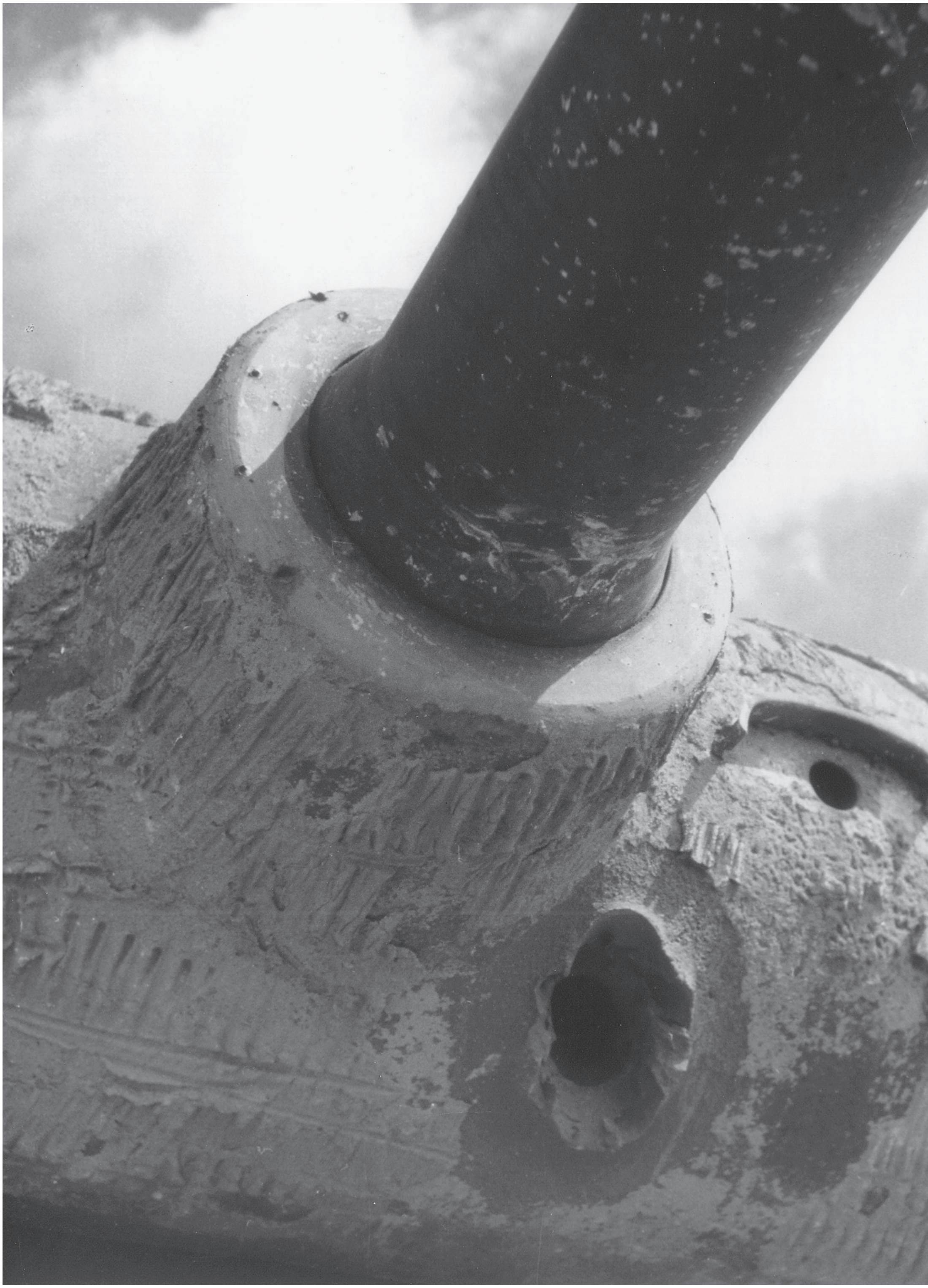
In July 1943, a number of German units were withdrawn and sent Italy. Four months later in November 1943 powerful battle-hardened groups were transferred to France in order to confront the expected invasion.

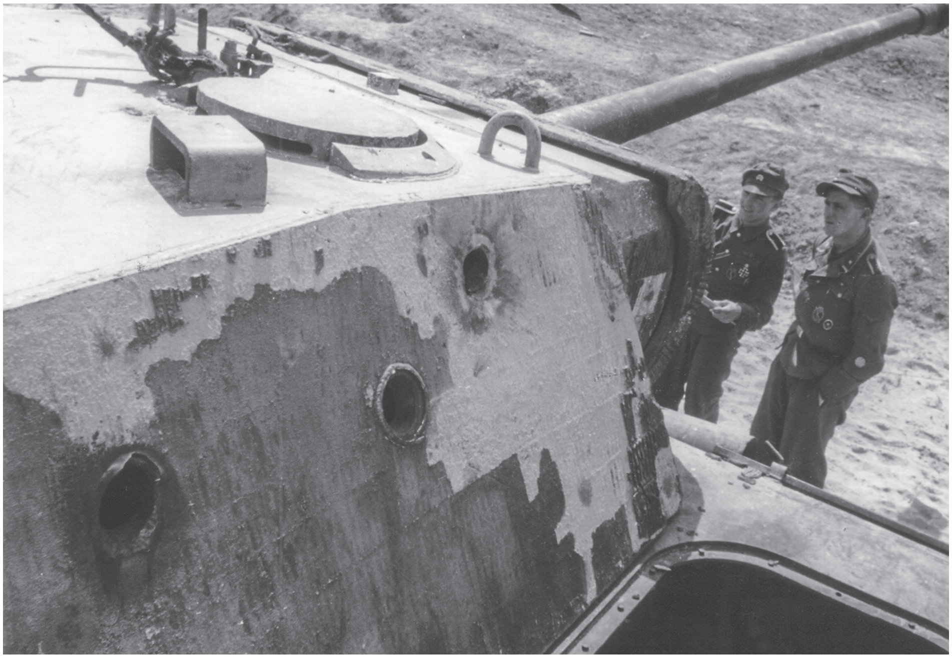
The weakened German armies that remained in the Soviet Union were now forced on to the defensive. As a consequence of these dramatic events the Red Army prepared major offensives in the north and south of the Eastern Front which would cause the Germans further major losses and ultimately force them back. On 27 January 1944, Leningrad was relieved after a 872-day siege and in the south the Crimea was re-captured.

In June 1944, *Operatsiya* (Operation) Bagration, a major offensive against *Heeresgruppe Mitte* (Army Group Centre) began. As a result of these attacks German forces were shaken and hit hard. The roads to Warsaw and East Prussia now lay open.

By January 1944, some 1,500 Panthers had been delivered to the fighting units. But the number of operational Panthers available was actually less. Total losses due to enemy action and those that were abandoned or blown-up by their

An anti-tank shell has hit the gun mantlet of a Panther and punched a hole in the thick armour. Note the aperture and rain sill for the *Turmzielfernrohr* (TZF) 13 telescopic gunsight. (Anderson)





The turret on the same Panther has received three hits to the side of the turret, all of which have penetrated the thin armour. The force of the hits has blown the Zimmerit coating off the plating. If the Panther could not be repaired then it would be cannibalized for spare parts.(Anderson)

crews, and the high percentage under repair cannot be estimated accurately. At the beginning of February there was a total of 1,323 Panthers operational. In the course of this month 100 were reported as losses.

The teething troubles of the Panther were largely rectified. Only the delicate final-drive units and the AK 7-200 gearbox were proving troublesome. Here the operational readiness of the PzKpfw V Panther was to a great extent dependent on the competence of the driver and the skilled engineers at workshop companies and supply units.

On 22 April 1944 I./PzRgt 2 submitted an experience report:

> Experience report regarding PzKpfw V
> In the battle around Proskurov and in the breakthrough by 1.PzArmee, the battalion was exclusively reliant on the help of the repairs unit, still short of sufficient spare parts. Between 6 March and 15 April 1944 the following experiences were made with the Panthers of I./PzRgt 2:
> A.) Engine HL 230 P30
> In general the engines have a significantly longer life than the first series. Highest reading 1,700 to 1,800km on three of seven available tanks. Engine damage was the same in each case (bearings and connecting rods).
>
> Engine fires
> These fires have also become significantly less. The causes now established for engine fires are:
> 1.) Oil lost from the filler cap as a result of faulty sealing. The oil dripped on the hot exhaust and ignited.

This JS-2 was knocked out at long range by Panthers from PzGrenDiv Grossdeutschland. The poor-quality cast steel of the turret has broken away over a large area near the driver's vision port, and the gun mantlet has been torn away by a direct hit. (BA)

2.) In several cases the carburettors overflowed, the ignition plugs became wet and would not spark, the fuel was expelled through the exhaust and leaked out between the seals as a result of which the fire spread outwards to the engine.

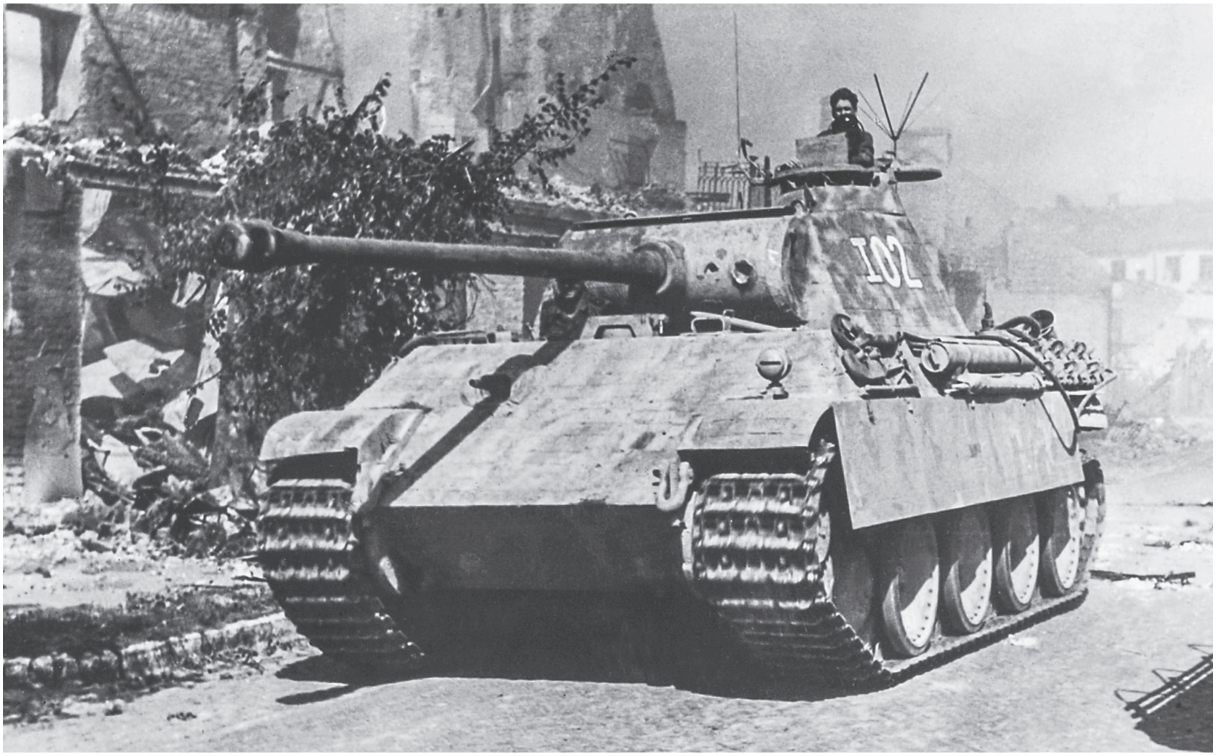
B.) Gears

The gears also had a long life but in several cases 3rd gear became unworkable after about 1,500km so that the gearbox had to be exchanged. The reason for the damage may be found in the overworking of 3rd gear during the mud season. Because no opportunity existed to exchange the gearbox; three tanks continued in action for another 250km. The drivers had to shift from 2nd into 4th. The Cardan shaft became defective in several cases and had to be exchanged.

The heavy wear and tear to steering brakes may also be attributable to long journeys in the mud. On account of the relatively complexity of the steering mechanism and the short technical training, one has to assume that not all the drivers have a basic grasp of how the brakes work. As in most cases the tank remained operational with its steering problem, this would have affected the final-drive units and caused major wear and tear on the brakes.

C.) Final-drive units

A very large percentage of tanks broke down through damage to these units. From 1 April 1944, a total of 13 out of 30 were exchanged, more left side than right. The system was not very tolerant of jerky steering movements in heavy terrain.



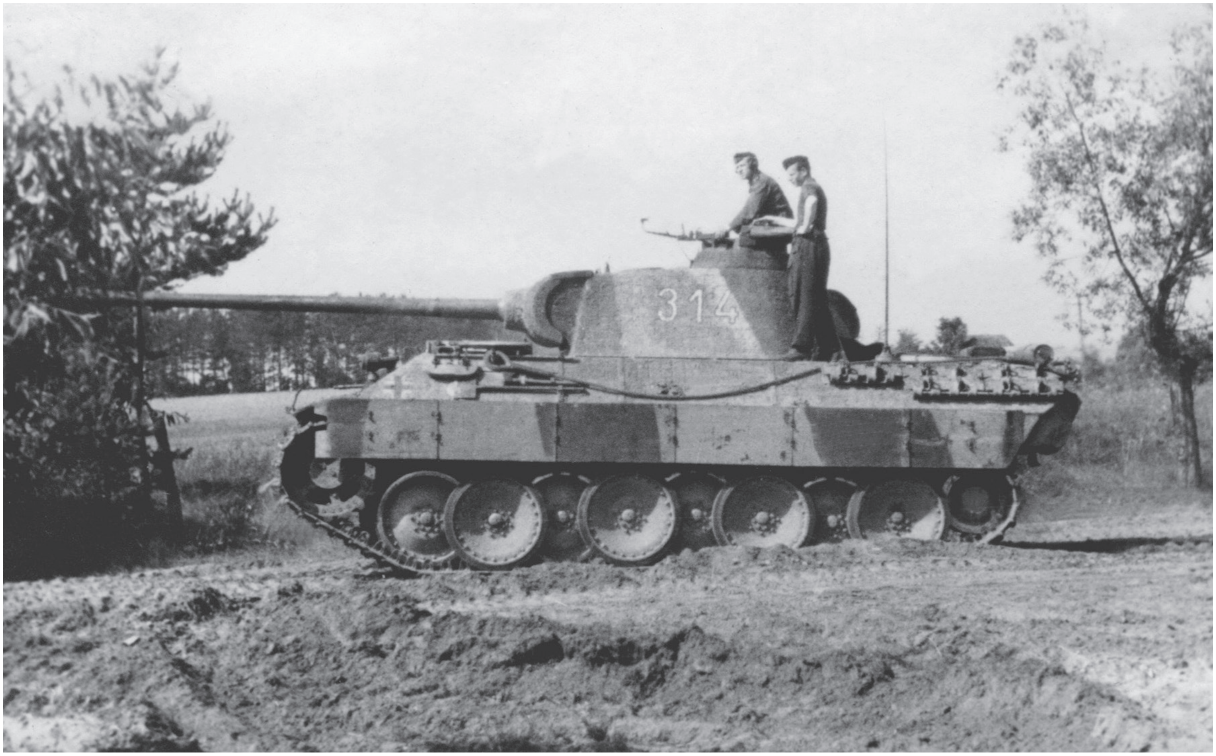
An extensively camouflaged *Panzerbefehlswagen* Panther has received a direct hit on the gun mantlet which has failed to penetrate the armour. (Anderson)

D.) Tracks and suspension
After 1,500 to 1,800km, the tracks begin to show very heavy wear. In many cases the side bars are bent outward or break. In four cases the tracks had to be renewed because a row of side bars had broken off.
Cause: Having been spent long periods in the field the tracks could not be checked and reconditioned as they should have been. The vehicle remained driveable until the defect deteriorated to the extent that it destroyed the track.

Although the life of the Panther has been lengthened significantly, an attempt must be made to avoid these high, sudden stresses which occur naturally in battle conditions:

1. Running the engine excessively especially going down a steep mountain road, and during fighting in heavy terrain.
2. Abrupt steering movements (cannot be avoided in battle).
3. Excessive stress on the Cardan shaft.

Many kilometres without a breakdown is the hallmark of a good driver and commander. In that respect, the battalion mentions PzKpfw V Chassis No. 154338, Engine No. 8322046 reading 1,878km, driver *Obergrefeiter* Gablewski, 4.Kp/PzRgt 2. The vehicle is still completely operational. With exception of track, all other items are still in very good condition. Engine oil consumption has been 10ltr per100km. The tank is still running with its original engine and transmission.



A PzKpfw V Panther Ausf A from PzRgt Grossdeutschland painted in the distinctive camouflage scheme of the unit. (Anderson)

Untenable conditions were common in certain areas for the fighting troops, mainly due to incompetent planning and logistical errors made by the higher command echelons. But the primary cause was the severe lack of supplies; fuel, ammunition and spare parts had to be transported over great distances and then distributed. The supply of recovery vehicles, such as heavy towing tractors and recovery tanks was catastrophic because industry could not deliver the quantities necessary.

Desperate Defensive Successes

In 1944, 5.SS-PzDiv Wiking fought on the southern sector of the Eastern Front. The main body of the division was encircled at Kovel and was under constant attack. In this situation II.Abt was sent to assist. In a readiness report dated 10 April 1944, a total of 58 Panthers out of 75 were reported to be operational. In the ensuing fighting, this strong unit re-established contact with the encircled troops, and the operation resulted in the division being saved and the front line re-established.

> SS-*Gruppenführer* Gille stated in his report:
> The division broke out of the Korssun pocket without weapons, equipment or military vehicles and was now retiring to rest and re-form. The re-establishment was to take place at troop depot Bergen. Due to the situation on the front, the

> remainder of the division remained at Lublin and was ordered to form a battle group of about 4,000 men for transfer to Kovel. Weapons were to be supplied. The situation required the immediate strengthening of the defences in Kovel, which had been declared a 'fortress'. The mostly unarmed infantry of the division was immediately sent by rail to Kovel, but ran into resistance at Nove Koszary and being almost weaponless, had to retreat to the west. Meanwhile some weapons had arrived and the division, although without heavy weapons, was sent to relieve 'fortress' Kovel, which by now had been encircled.
>
> This resulted in heavy casualties for the division, especially in officers and NCOs, so that the retreat for rest was out of the question although re-forming was still necessary. The newly arrived armoured infantry battalion (without armoured vehicles) was deployed and suffered severely. The also newly arrived Panther battalion had to be deployed without any repair crews, and many of its vehicles suffered damage which could only be repaired after the arrival of the workshop company.
>
> After this operation the division had to be transferred to a troop depot where, after receiving trained reinforcements, weapons, equipment and other vehicles, it will be operational in six to eight weeks.

Panthers of II.Abt played a decisive role in this success. After partial re-formation at the Heidelager depot, on 1 June 1944 the division reported 77 Panthers and 27 of 73 PzKpfw IV tanks operational. The armoured infantry battalion was not yet up to strength and of 374 transport vehicles only 117 were available.

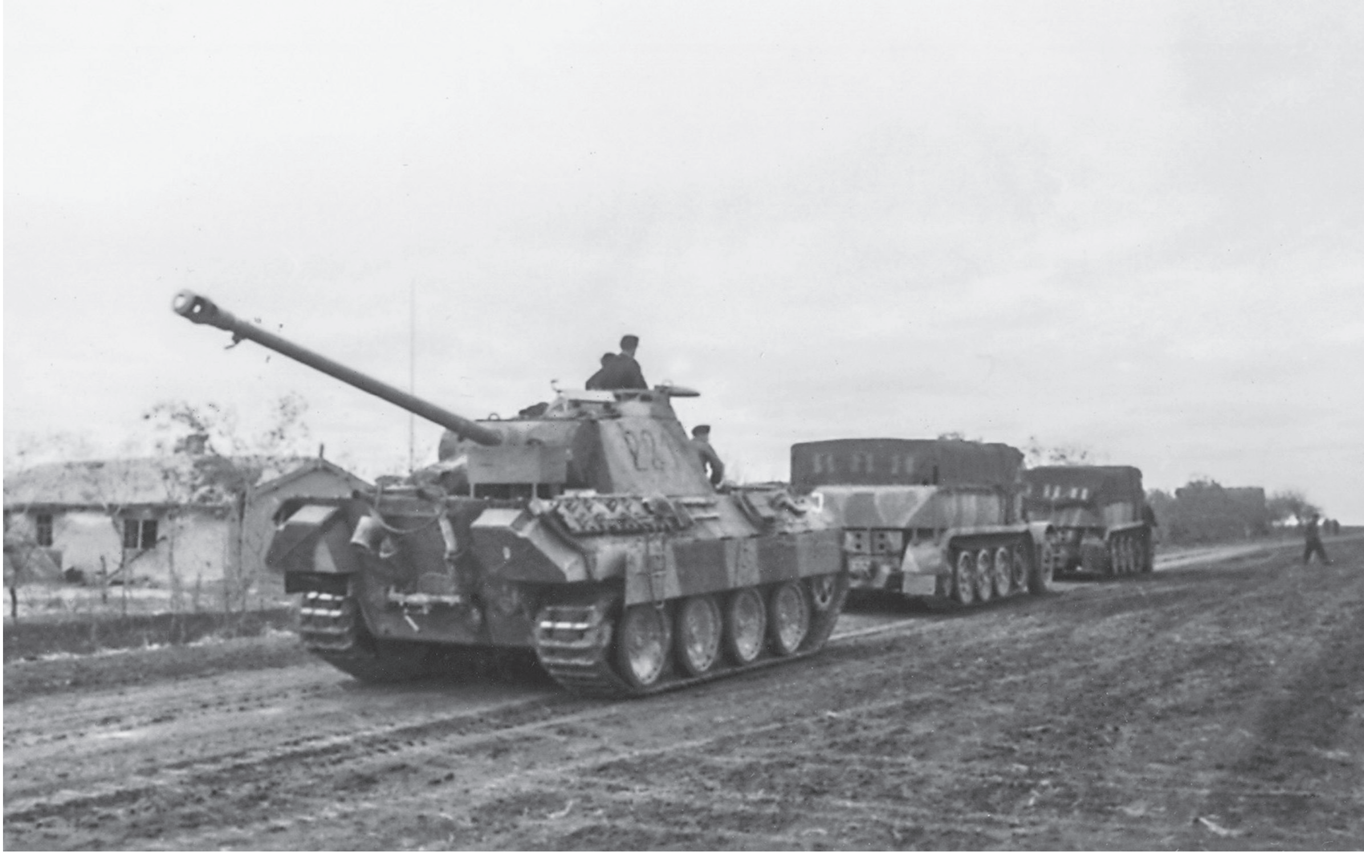
In July 1944 elements of SS-PzDiv Wiking took part in the tank battle of Macieyov. Here again a major defensive success was achieved. Within two days, under favourable conditions, 100 enemy tanks had been destroyed for no German losses. Over such flat terrain, the powerful and accurate gun in the Panther was deadly even at extreme ranges.

The unit fought another action in the area northeast of Warsaw where a major attack was repelled although this time with losses.

On 7 September 1944, the destruction of 500 enemy tanks was reported. At this point the PzRgt reported 27 of its 150 tanks were still operational, 19 of which were Panthers. This defensive success deceived nobody into believing that the line could be held for long. Unlike the situation in the summer of 1943, the Red Army had shown that they were in a position to quickly replace exhausted or defeated units.

In May 1944 PzGrenDiv Grossdeutschland provided an example of an effective mobile operation. On 2 May 1944 the divisional War Correspondent Platoon reported:

> Breakthrough Prevented – 96 tanks destroyed in a single day
>
> In the battle area northwest of Jassy, in the early hours of 2 May, the Soviets launched an offensive intended to break through the German positions in the



In the relative dryness of a Russian summer, two SdKfz 9 heavy tractors would be sufficient to tow a damaged Panther. But even light rain showers would be enough to transform the ground into a quagmire; in such conditions it would be necessary to use up to four towing vehicles. (Anderson)

north of Romania. The offensive, made with over 300 tanks, six rifle divisions supported by a heavy artillery bombardment and also continuous attacks by ground-attack aircraft, was aimed against PzGrenDiv Grossdeutschland.

While the grenadiers and riflemen, outnumbered by the Russian infantry, held out bravely in their trenches, tanks and mobile assault guns engaged the numerically superior Soviet armoured spearheads. After some of these Soviet forces had forced their way into the trench defences, grenadiers and riflemen of Grossdeutschland, together with units of SS-PzDiv Totenkopf, another PzDiv and the Romanian Army, mounted counterattacks and restored the situation along all sectors.

The major part played in this success was by PzRgt Grossdeutschland led by Oak-Leaves holder Oberstleutnant Willy Langkeit, whose Panthers and Tigers destroyed 96 enemy tanks, including some heavy tanks, in bitter fighting around Jassy. His 41st victim of the day was the 1,000th Soviet tank destroyed by the unit since his first battle in March 1943.

After this major success, mainly obtained by the Panthers of Grossdeutschland, the fighting moved during the day west towards Targul Frumos.

Later in 1944, *Generalleutnant* von Manteuffel, commanding officer of PzGrenDiv Grossdeutschland assembled the events of May:

Camouflaged with the available materials, a Panther Ausf A awaits the next operation. Combat success was easier to achieve during the fighting against the Red Army in the open spaces of Russia, than when fighting Allied forces after D-Day, which were protected by dominant air power. (Hoppe)

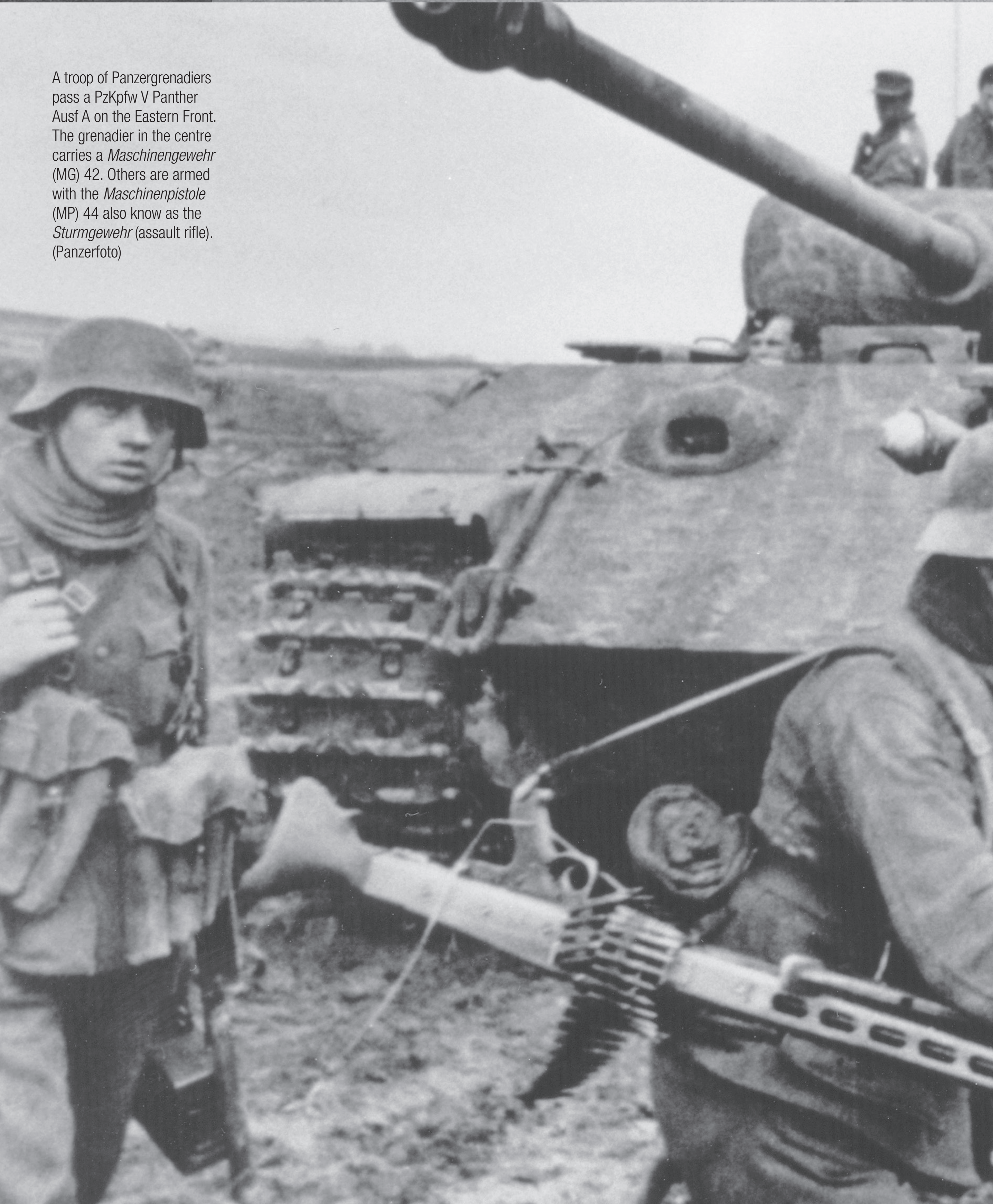
The fighting value of the division

PzGrenDiv Grossdeutschland was excellent, its fighting value exemplary. The troops felt themselves to be superior to the enemy, the battles in April had shown that without any doubts. Strength of the division (estimated):

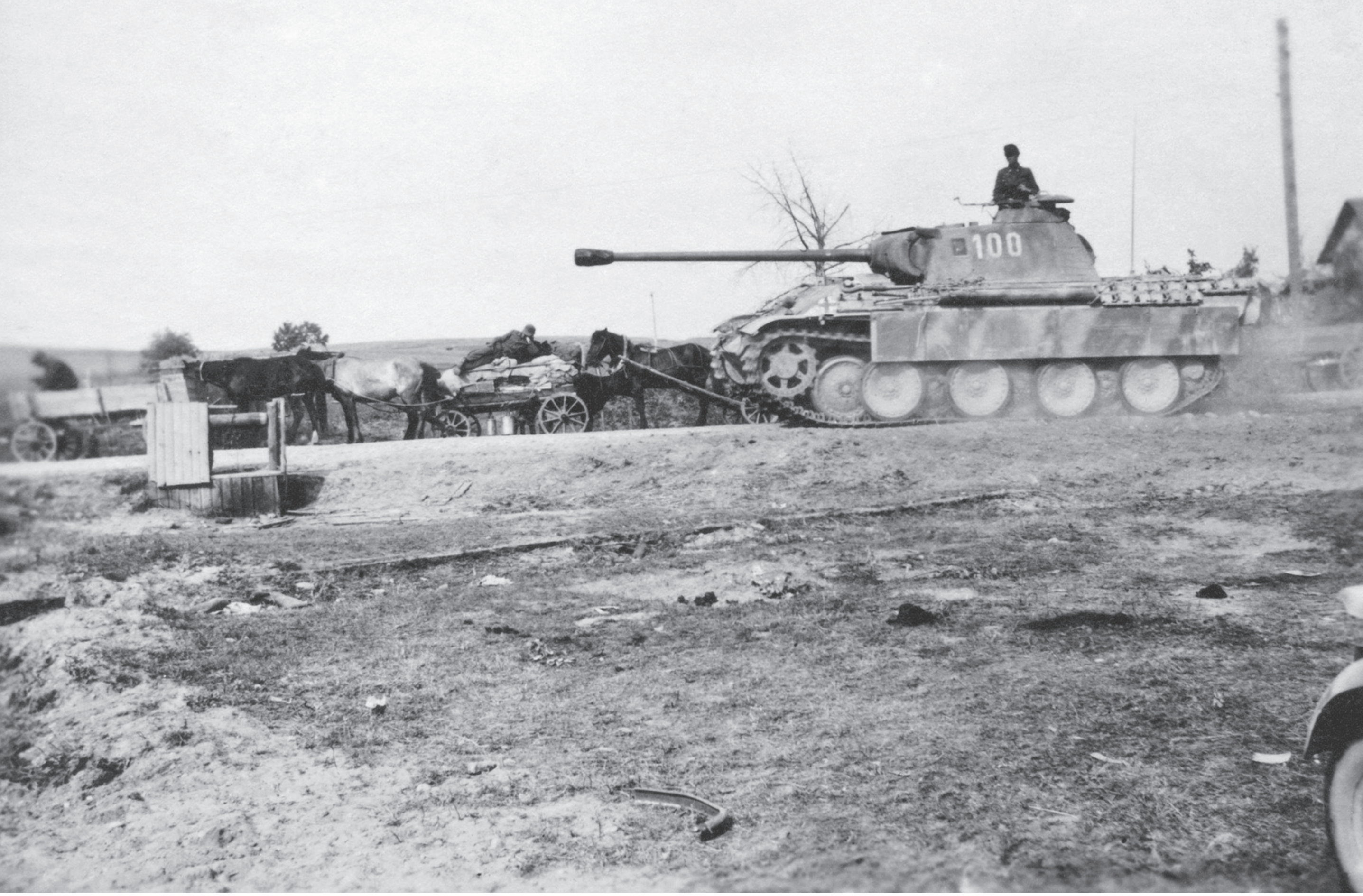
Two infantry regiments
One SP assault gun battalion with c.40 guns
One pioneer battalion, full compliment
One reconnaissance battalion at 66 percent strength
One PzRgt with:- One PzKpfw IV Abt (c.40 tanks)
  Two PzKpfw V Panther Abt (c.80 tanks)
  One PzKpfw VI Tiger Abt (c.40 tanks)
One *Panzerartillerie*-Regiment, full inventory guns
One FlakAbt with three batteries of 8.8cm guns

The unit was well supplied with ammunition and fuel; also signals equipment (radio and telephone). As the result of a good radio network, I placed more worth on radio contact than on landlines; nearly all of these were destroyed by shellfire on the first day of the attack.

While I was speaking tank-to-tank with the commander of the PzRgt, who was aboard his command vehicle, we heard tank exchanges of the heaviest



A troop of Panzergrenadiers pass a PzKpfw V Panther Ausf A on the Eastern Front. The grenadier in the centre carries a *Maschinengewehr* (MG) 42. Others are armed with the *Maschinenpistole* (MP) 44 also know as the *Sturmgewehr* (assault rifle). (Panzerfoto)



A PzKpfw V Panther Ausf G of PzRgt31/5. PzDiv passes refugee traffic in East Prussia. The regimental shield, a red devil on a black ground, is visible on the turret. By the end of 1944, German tank units were only capable of fighting by using delaying tactics; the advance by the Red Army had become unstoppable. (Erdmann)

calibre… at first we thought that a company of our own Tigers had blundered. The commanding officer of the Tiger Abt was present and had ordered the attack, and approached the enemy tanks to within 1,800 to 2,000m then opened fire. Four enemy tanks were soon in flames and as far as I could see three others made off at high speed. I ordered one company of PzKpfw IVs nearby to give chase and destroy them. These fast and manoeuvrable tanks had the good fortune to come up on the Russian tanks from cover at 1,000m and attack from the rear. The enemy tanks stopped and burned out. I have often reported on these Stalin tanks. Advantages: Powerful gun, strong armour, low profile (about 51cm lower than our PzKpfw VI). Disadvantages: slow, not sufficiently manoeuvrable, their crews in my opinion are not sufficiently trained on the tank.

By noon, the PzRgt in the PzGrenRgt area had destroyed some 250 tanks. I detected a certain hesitancy in the enemy attack: although he still had many tanks, he was only shooting from long range and the attack was not moving forward. At first we were not interested in venturing with our tanks so far into the enemy occupied area in order to wipe them out.

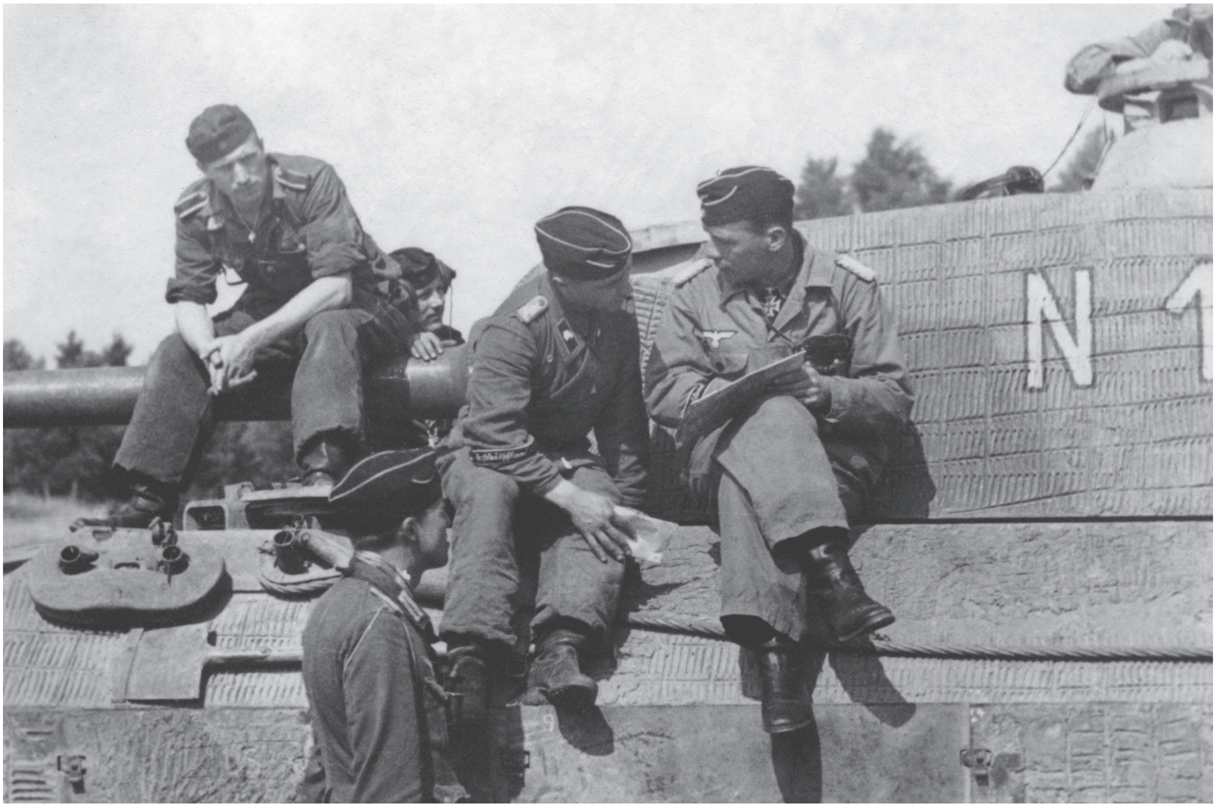
Meanwhile since 09:00hrs alarming reports had been received from the right-hand divisional sector. I had promised my friend, *Oberst* Niemack of the PzFüsRgt, to attack with him with my PzRgt at noon… In the left sector with PzGrenRgt was a mixed battalion of Panthers and Tigers left behind. The PzRgt destroyed around 30 Russian tanks immediately. When darkness fell, the involvement of the PzRgt in this sector of the divisions had completely restored the situation.

Our losses in tanks was less than ten, a very much greater number were more or less lightly damaged.

It was a great success. The breakthrough in the direction of Ploesti (Romanian oilfields) had been prevented… I estimate the enemy losses in tanks destroyed at approximately 350 and some 200 military vehicles damaged. It was also important for me to get close to the Stalin tanks which I wanted to thoroughly inspect and photograph.

In my view the success was the result of correct appreciation of the situation generally.

My experience:
- In an armoured battle, all other branches must be subordinated to support our tanks unconditionally.
- The tanks should not be content with defending against attacking enemy tanks from good shooting positions, but destroy them wherever they see them or guess where they are. For this reason, tanks must always attack again and again.



A Panther, turret number N 1, from the signals platoon of PzRgt Grossdeutschland. Note the side aprons have have been coated with Zimmerit anti-magnetic paste. (Anderson)

> - Movement and fire are to be combined, even in a tank-versus-tank battle, in order to prevent oneself being attacked.
> - Only deploy as many tanks in defence as are needed to master the situation. The tank battle must develop from behind, and at all times one must have a battle-ready reserve of tanks, particularly those with heavier guns (Panther and Tiger).
> - The speed of the tank on the battlefield, not that on the road, has proved, along with good leadership and shooting skill of the crews, to be a decisive precondition for a successful engagement against enemy tanks.
> - Tank commanders up to the divisional commander belong on the field of battle and indeed wherever the seat of the fight can be found.
>
> Signed, Manteuffel.

There is little to add to this assessment as it represents all the principles of German tank tactics.

The D-Day Landings

On 6 June 1944, the greatest landing operation of World War II took place when more than 150,000 Allied soldiers came ashore in Normandy during the course of Operation Neptune; the long-expected attack on mainland Europe had begun and the Second Front long demanded by Stalin was opened. Before the German forces could react fully to the circumstances, the attackers had established a firm foothold in the coastal area.

German tank units which had been positioned to halt the Allied assault were equipped with variety of tank types. The greatest proportion in the divisions were some 300 PzKpfw IVs, and there were only 160 Panthers available (on paper). At the beginning of June, 12.SS-PzDiv Hitlerjugend reported that it had 101 PzKpfw IVs and 81 Panthers. Only 60 percent of the latter were operational, and they lacked three command vehicles and did not have any *Bergepanther* recovery vehicles.

On 27 June 1944, according to the weekly reports, there were still 32 PzKpfw IV and 24 Panthers operational. The commanding officer complained that the absence of FlaK protection, which was a serious matter on account of Allied air superiority.

On 3 July 1944 the Inspector-General of Panzer Troops published a list of tanks seriously damaged or destroyed. (According to this document not all tanks which figured are included here.) On 25 June he published an experience report on the fighting in the west, extracts of which follow below:

> 1.) The experiences related in tank warfare refer to actions against the Allied invasion army between 6 June and 24 June 1944. These action took place in the typical tall hedgerow territory [Bocage] of Normandy and had some features of actual ‘bush warfare’.

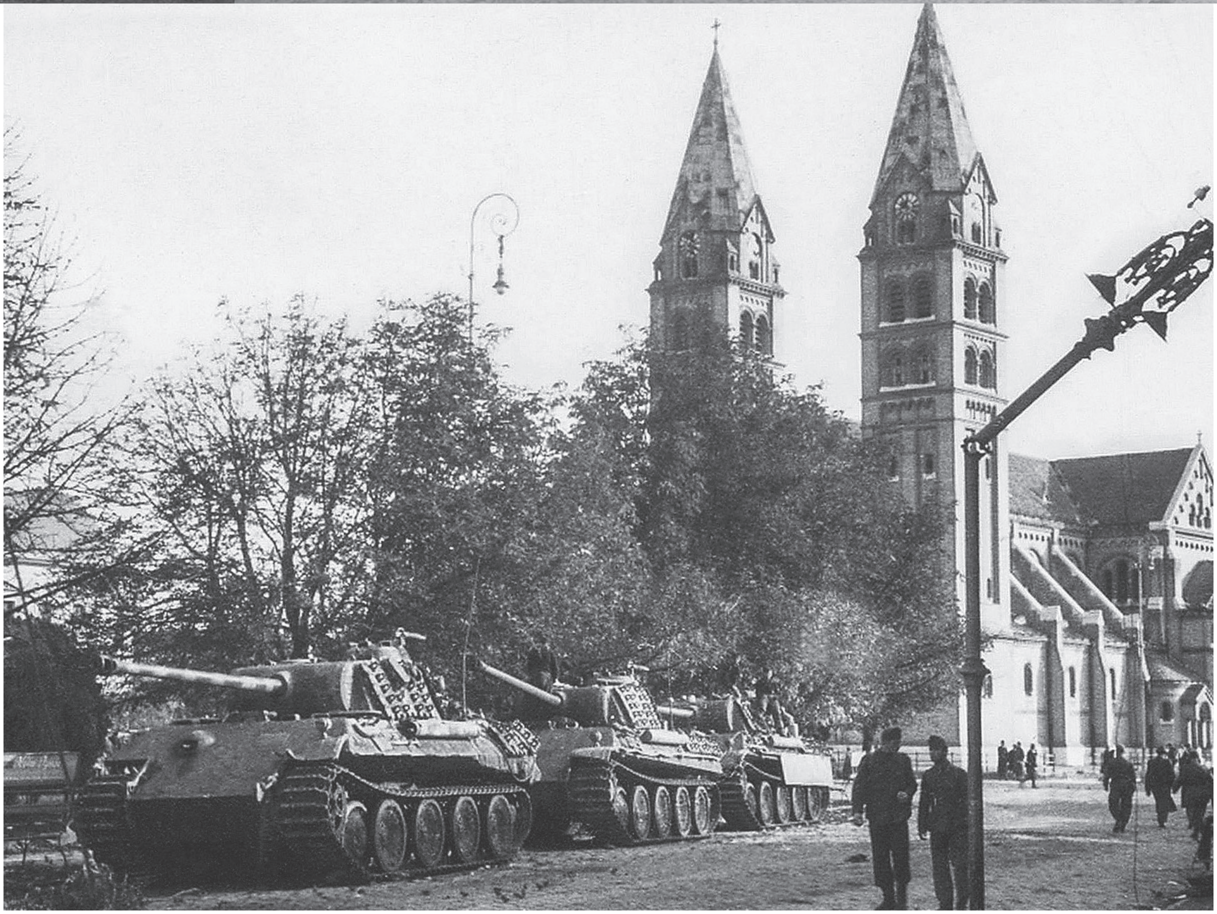
Panzers of 3 SS-PzDiv Totenkopf on the advance. The unit symbol, a stylized *Totenkopf* (death's head) has been stencilled on a rear stowage container. (Anderson)

15.) Sensitivity to fire. The British and US tanks are very sensitive to being fired at… after sustaining their own first casualties they turn away and seek battle next day only using artillery. [He probably means the tank crews.]

16.) Accuracy of fire of enemy tanks. The good shooting of enemy tanks from long range is praised from several sides. They opened fire in some cases faster and with more precision than our own weapons.

18.) Tank operations in open country. Open tank-favourable terrain, is to be found to a limited extent only around Caen. Here the enemy does not change his procedure from what we had witnessed previously: he mainly uses his tanks only in small groups (of up to 50). He limits them not only to immediate infantry support, but where the situation is unfavourable moves them up to several kilometres forward even without infantry support.

19.) The main pressure from enemy tanks in tank-unfavourable territory lay – as expected – on streets and lanes. This was where the main battles took place.



Autumn 1944: Panthers of 23.PzDiv parked near a church in a Hungarian town. Crews in this division ignored official directives and fitted track sections on the turrets of their tanks to increase the armour protection. (PeKo)

> 20.) The Normandy hedge country is unsuitable for tank operations. Even for a single tank the terrain is unfavourable.
>
> 23.) Use of artillery. The accuracy of enemy artillery over such an obstructed landscape is exemplary, as is the cooperation with aerial artillery spotters and forward observers in tanks.
>
> 24.) Attacks by fighter-bombers against supply roads. Their accuracy and massed use paralyzes the supply routes by day and halts the bringing up of reinforcements.

This report is very clear. The main characteristic of the desperate defensive battles was that the Allies had absolute control of the airspace, which made bringing forward of reserves into the invasion area by day almost impossible. The enemy artillery was very accurate and and at the beginning was supported by the heavy naval guns of the invasion fleet.

The superior quality of the Panther and Tiger tanks was counteracted by the landscape being unfavourable for tank operations. Their deadly accurate guns were almost useless in a countryside limited by tall hedges and sunken roads; most tank-versus-tank battles occurred at ranges from 200 to 500m. Here their superiority could be challenged, and under such conditions it was possible to ambush and destroy a Panther or Tiger by firing rounds into its sides and the rear of the hull.

Enemy air attacks which disrupted the supply of ammunition and fuel severely limited the operational capabilities of the tank units. The number of tanks blown up by their crews was high and often exceeded the number destroyed by enemy action.

On 20 June 1944, the commander-in-chief west; *Heeresgruppe* D (Army Group D) reported:

> Experiences from the Normandy front
>
> Four facts must be highlighted:
> 1.) Total enemy air supremacy.
> The enemy air force dominates numerically, in its range almost unlimited, not only the main battlefield, but also the approach and supply roads radiating outwards for from 150 to 200km. Furthermore enemy bomber formations roam as far as their home bases to destroy the large railway connections to the rear, especially railway junctions and goods yards.
>
> Despite the highly developed railway network in the west and the many good roads and byways, the enemy has succeeded by continuous heavy attacks by his air force to severely disrupt our supply routes and inflict heavy losses in rolling stock and vehicles. The supply and the bringing up of reserves is now a serious problem.

Oberführer Harmel, commanding officer of 10.SS-PzDiv, which in the course of June 1944 reached Normandy, reported on 4 July 1944:

> Enemy tactics
> In good weather carpet bombing or low-level attacks by enemy aircraft. This is accompanied by, artillery bombardments never witnessed before in this war. Barrages continuing hour after hour, then a wall of smoke is laid to conceal tanks advancing 50m behind.

In mid-July, 9.PzDiv was transferred to Normandy with 78 PzKpfw IV and 79 Panthers. A Major Riechel described in his report of 25 July 1944 a very disquieting development:

> 8.) Our own tanks are only deployed as infantry support. A tank operation in the true sense is not possible because the mobility of the tanks is very limited by the sunken roads enclosed with high hedges.

The German tank, once the decisive weapon to win battles, was downgraded by the conditions in Normandy to an infantry-support vehicle. The Allies could almost impose their own rules on the German Panzer divisions and in the Soviet Union they were fighting on the defensive.

In the summer of 1944, the following units were added and most were equipped with the Panther: 116.PzDiv had 73 PzKpfw IV and 79 Panthers; 9.PzDiv had 78 PzKpfw IV and 79 Panthers; 11.PzDiv had 79 Panthers.)

In the autumn the newly formed PzBrig (105 to 108 and 111 to 113) were brought forward but these units suffered from the same problems as other Panzer divisions.

A report from PzBrig 112 dated 16 September 1944 read:

> 1.) PzBrig 112 was deployed southwest of Epinal against a breakthrough by US forces. The Panther Abt was withdrawn again, the GrenRgt and PzKpfw IV Abt remained in action near Epinal on 15 September.
>
> 2.) The Panther Abt in PzBrig 112 has practically been wiped out. It has only four operational Panthers. Another three need short-term repair, a command Panther will take longer.
>
> 34 Panthers are total losses. They had practically no mechanical defects in action. The exclusive cause of the total losses was air attacks by 16 to 20 fighter-bombers firing rocket projectiles and phosphorous shells from artillery at the rear. Crew

Panthers of PzAbt 52 assemble at a farm and use the buildings for cover. The gun barrels point in all directions for an instant response to attack. The vehicles are camouflaged against observation by patrolling enemy aircraft. (PeKo)

> losses are substantial. The commanding officer of the battalion is said to be seriously wounded, his adjutant dead.
>
> There was no point in retrieving the write-offs, they were either totally gutted by fire or torn apart by their own exploding ammunition. Among the 34 total losses is a command tank vehicle, the second PzBefWg (mentioned above as needing long-term repair) has hits on the turret. The workshop platoon of the PzAbt is fully operational as regards staff and materials. The recovery platoon still has three s ZgKw 18t and two Panther hulls.
>
> As the principal cause of the (defects), poor training of drivers is to blame. The battalion has received drivers who are operating a Panther for the first time. Tanks are being written-off for quite minor technical problems.

This report shows that most technical problems on the Panther had been resolved, and it proved to be a reliable fighting vehicle. It also showed that the deployment of German tanks was very restricted: The entire battalion was lost.

The presence of a PzKpfw IV battalion together with the Panther battalion in the PzBrig is somewhat puzzling and needs further research (see Chapter 5:

Organization) It is interesting to note the reference to Panther hulls as towing vehicles. These may have been Panthers given a major overhaul and converted to recovery vehicles.

Because of the superiority of the Panther in weapons and tactics, whenever US forces saw signs of a tank attack developing they immediately called up a strike by fighter-bombers. It is remarkable that all tanks that were hit were considered to be total losses. This can be explained, to some extent, by the armour over the top of the fighting compartment being only 16mm thick.

On 19 September 1944, a failed attack was reported by PzBrig 108:

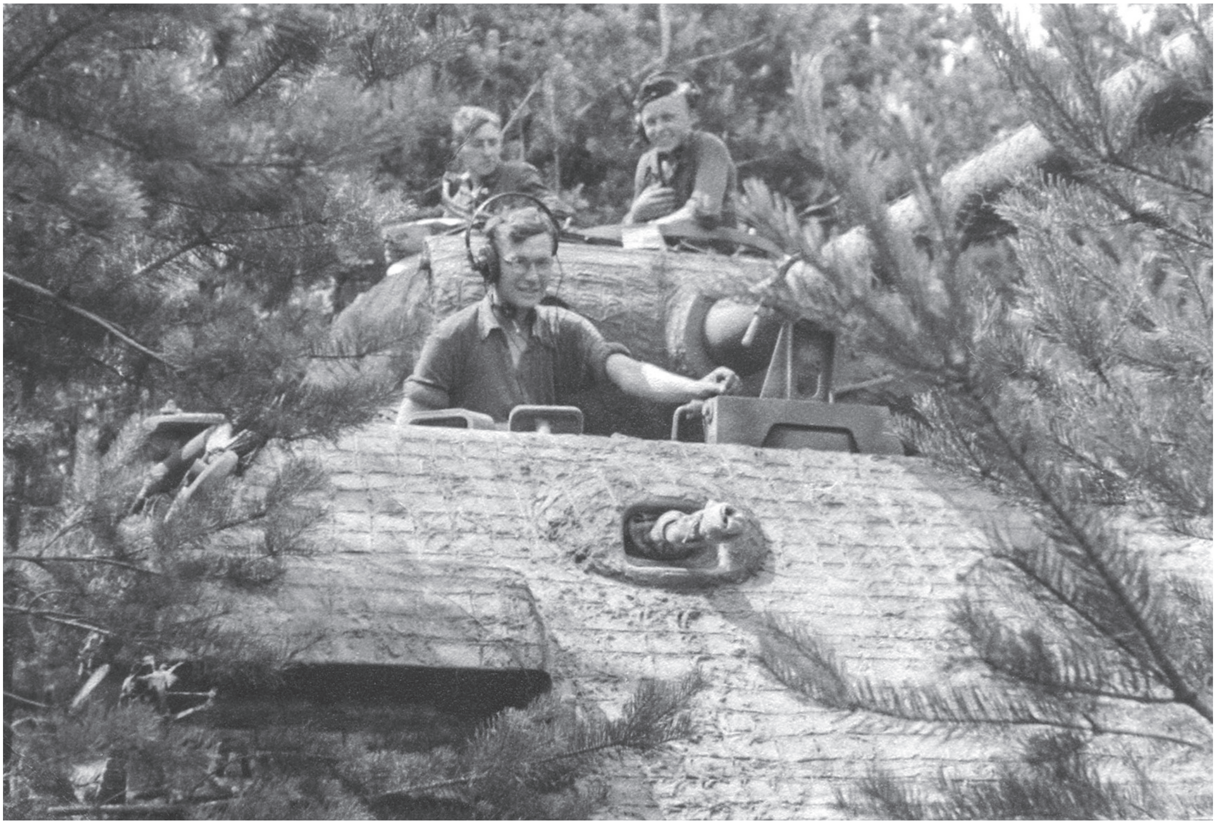
> Report on the first operation by PzAbt 2.108/PzBrig 108
> After moving up 40km on the night of 18 September, PzBrig 108 prepared for action near Halsdorf, 10km south of Bitburg. The area chosen was on a level which could be surveyed by the enemy and was probably known to him. The attack itself was carried out without previous preparation by heavy weapons, the tanks attacked the enemy positions appearing from behind a small hill. The tanks then received well aimed anti-tank gun and tank fire from 10 to 20m range.
> Loss in tanks: 12 tanks total
> Loss in officers: Commander and two platoon leaders dead
> Adjutant and two company commanders seriously wounded
> One company leader and four platoon leaders slightly wounded
> The PzGren following the tanks suffered very heavy losses in men and armoured half-tracks from anti-tank gun and tank fire.

This report is a good example of how not to carry out an attack. An exact evaluation is difficult to make using this basic information, but the tactical errors produced very serious consequences. The selection of the area for preparation was negligent, to make an attack over a hill not knowing what was on the other side was reckless, and apparently no reconnaissance was carried out. An artillery bombardment immediately before the attack and then further monitoring by artillery observers was also not possible: PzBrig 108 did not have artillery.

Before the Defeat – Re-constitution into the PzDiv 45

The desolate situation in which the Panzer divisions found themselves at the beginning of 1945 resulted in a new basic organization, 'Panzerdivision 45'. It was applicable to all existing PzDiv and PzGrenDiv. The conversion was valid up to 1 May 1945.

The Inspector-General of Panzer Troops controlled it as follows:



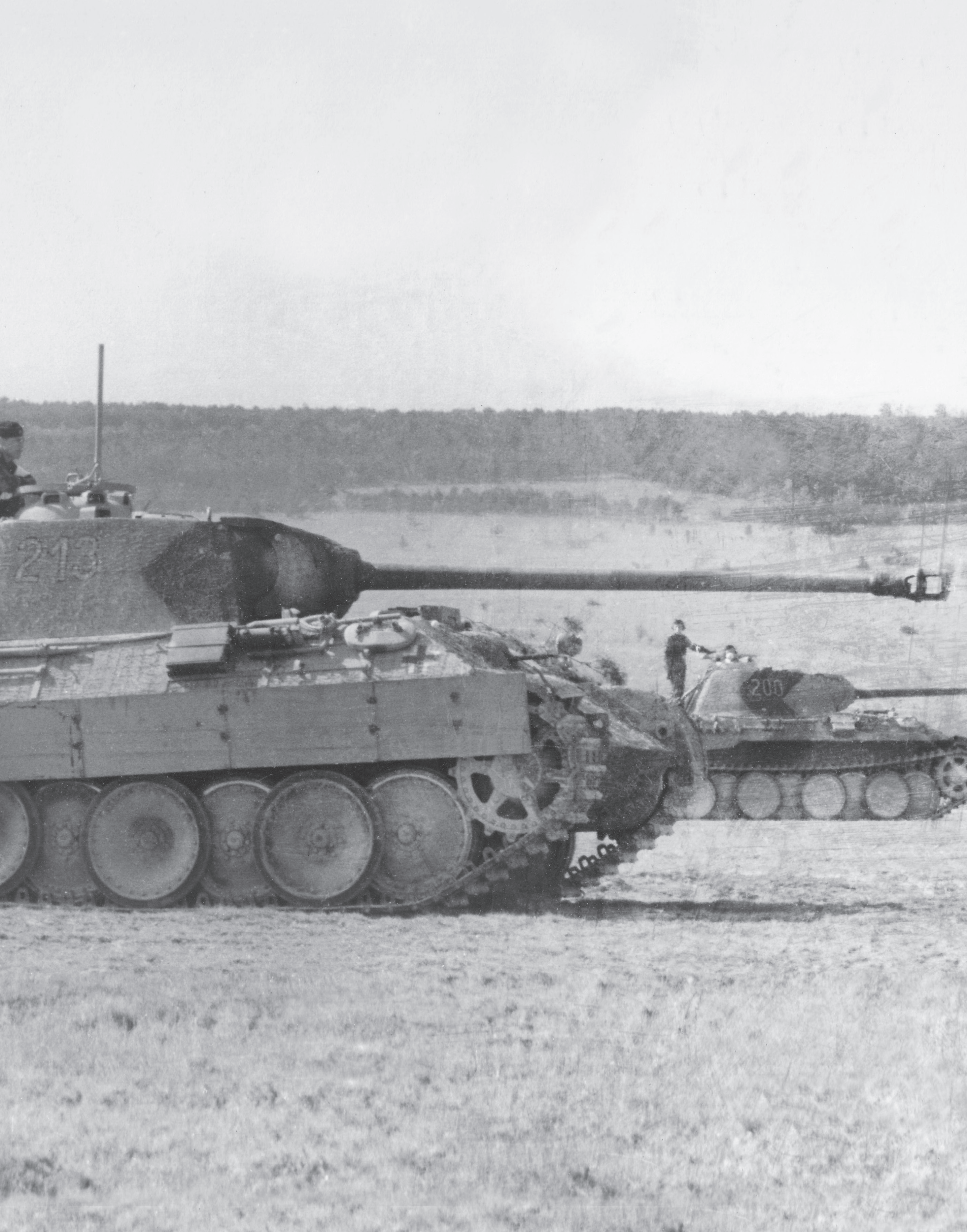
Zimmerit anti-magnetic paste, to prevent enemy anti-tank teams attaching mines, was applied at the factory. Note the transport cradle for the main gun is in place. (Hoppe)

1.) The basic organization of 'Panzerdivision 45' is in immediate effect for all PzDiv and PzGrenDiv of the field army.
2.) According to the organization of PzDiv 45, Pz and PzGrenDiv are to be re-organized using their available personnel and materials. Divisions whose strength in personnel and equipment is too low in order to adapt to PzDiv 45, are to convert into battle groups.

Because of the situation, no new formations were envisaged. The KStN was correspondingly adjusted, thus in future the tank company would have only ten Panthers or PzKpfw IVs in each. As the divisions in the field were in overall bad, but very varied, condition another organizational model 'Battle Group PzDiv 45' was drawn up to run in parallel with PzDiv 45. It noted that besides other partial units one of every two PzGrenRgt regiments would be removed. These divisions, some with fewer than 20 tanks, were only a mere shadow of those powerful units which headed into battle in 1941.

On account of a general lack of battle tanks, fuel and ammunition, many Panzer divisions were downgraded into battle groups. A 'very free interpretation' was taken by command staffs as to as to the numbers in their available force.

After more than five years of fighting and millions dead, and large areas of various countries devastated, the war in Europe headed towards its end.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The Panther in Comparison

7

In the early summer of 1943, during the great battle at Kursk Bend near the village of Prokhorovka, the Panther was 'baptised' in combat. How did this medium tank stand in direct comparison with its opponents – and can such a question really be answered?

The development of a new tank takes place in a complex field of tensions between what is desired from the tactical point of view, and the technical specifications and the final cost per unit. If this new development is to go ahead according to plan, the production of tanks and spare parts for the current production line, the obtaining of materials and the making available of factory capacity have to be coordinated.

The shocks which, one after another, hit the front-line troops, the military and industrial decision makers and finally the armaments industry following the appearance on the battlefield of the T-34 in 1941 can easily be imagined.

The new German Panther battle tank was created as a direct reaction to the T-34. Reduced to the choice of armament, the Russian KV-1 heavy tank influenced this process to a certain extent. The T-34 was newly to define the three basic parameters of the tank weapon system – firepower, mobility and armour – and ultimately the overall concept.

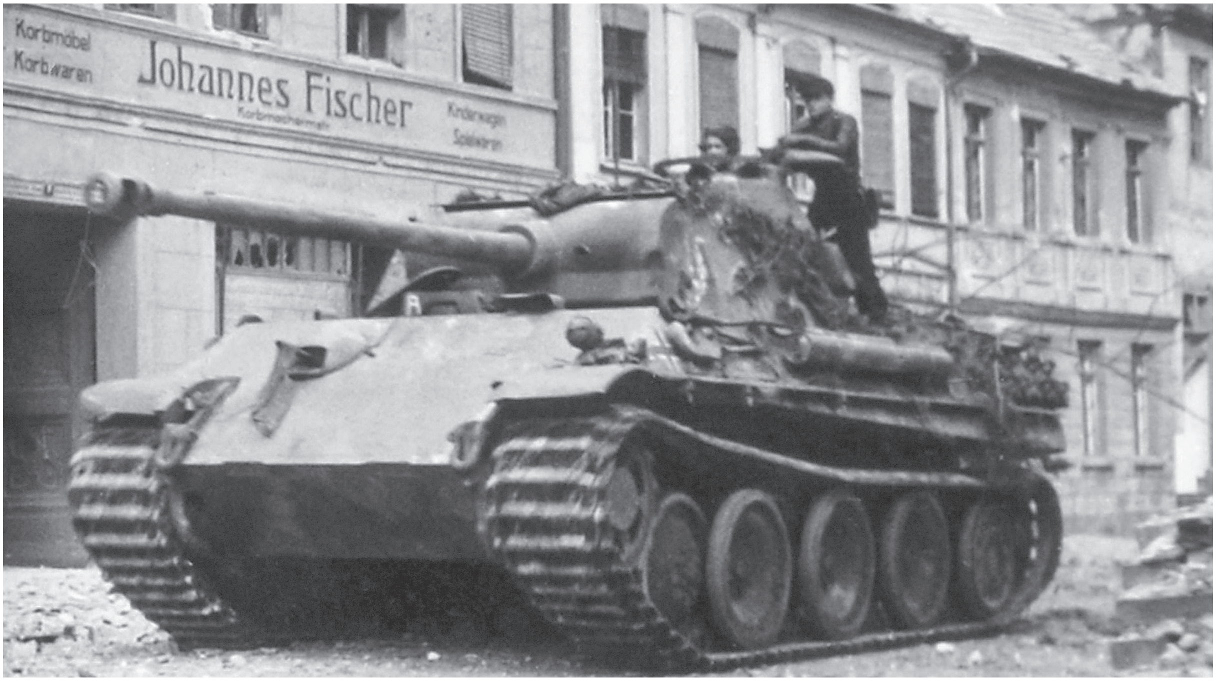
The way forward paved by the T-34 led in the post-war era to perhaps the first strategic main battle tank, the T-54. The Kliment Voroshilov (KV – named after a Soviet defence commissar and politician) in turn ushered in the phase of the heavy battle tank which lasted into the 1960s.

Besides the wartime German Reich, other military nations, primarily the US and later the UK, took up the challenge, naturally influenced by the efficient German developments during the years 1943 to 1945, against which they had had to fight in the field. In the following comparisons it should not be forgotten that what is presented is a purely academic contrast of the technical capabilities

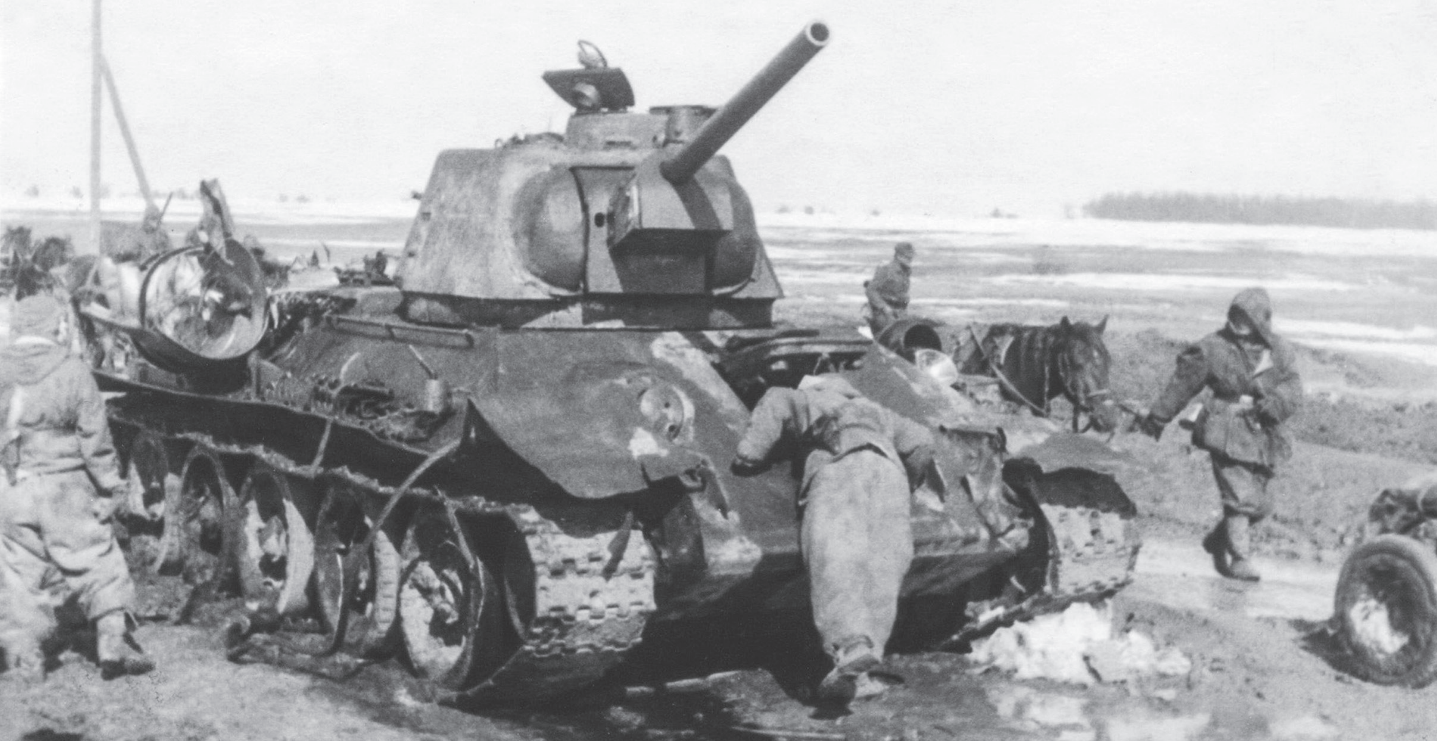
Panthers of PzGrenDiv Grossdeutschland on the gunnery ranges. The commander of the tank in the foreground is using a *Turmbeobachtungsfernrohr* (turret periscope) to observe the targets. (Anderson) in the areas of vehicle, weapons and armour. The actual qualification of the weapon systems was dependent on the interplay of many other factors, such as:

- Availability of sufficient supplies of the weapons system
- Technical level
- Availability of consumable materials such as fuel and ammunition
- Quality of the repairs services
- Adequate reserves (tanks)
- Possibility for crew to observe the exterior from within the confines of the vehicle
- Whether it was fitted with radio
- Real cross-country mobility
- Quality of tactical leadership at all levels
- Level of training of personnel
- Quality of reserve personnel

Other major influences must be taken into account, such as the type and quality of the supporting branches (reconnaissance, infantry, artillery, pioneers, air force). The significance of the tactically correct way of proceeding can be shown by these examples: In North Africa, a US-built M5 Stuart light tank succeeded in avoiding a PzKpfw VI Tiger Ausf E detected by reconnaissance. It was then positioned to use its 37mm gun at short range to put the heavy tank out of action. A company of PzKpfw IV able to come up on several JS-2 tanks from behind attacked and left them in flames.



A Panther Ausf G from a batch produced towards the end of the war, has the thicker gun mantlet and does not have Zimmerit. (Anderson)



The large turret identifies this as a T-34/76 M1943 and is a later model fitted with a cupola for the commander. All versions of the T-34 were powered by a 38,800cc V-12 Model V-2-34 500hp diesel engine which gave the Soviet tank better range than the petrol-engined German tanks. (Anderson)

As these examples show, it is irrelevant if these successes were obtained by tactical skill or good luck. The commander of the much more powerful tank made a fatal error. Errors are unavoidable, as battlefield events are dynamic.

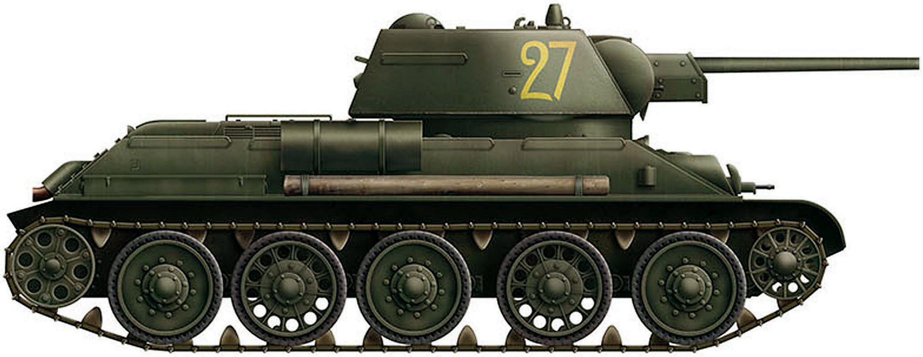
The Red Army – A Threatening Situation

After the German invasion, the Soviet Union was placed in a desperate situation. The production of weapons had to be brought up to maximum output to keep pace with the devastating losses. There was hardly any capacity available for basic improvements to the T-34 and the KV. These defects, recognized soon after the invasion, such as restricted observation field and the lack of radio equipment, could not be improved due to the difficult economic situation. The Lend-Lease Program was important for their survival and they received vast numbers of trucks, tanks, radio equipment and much more military equipment vital for their survival.

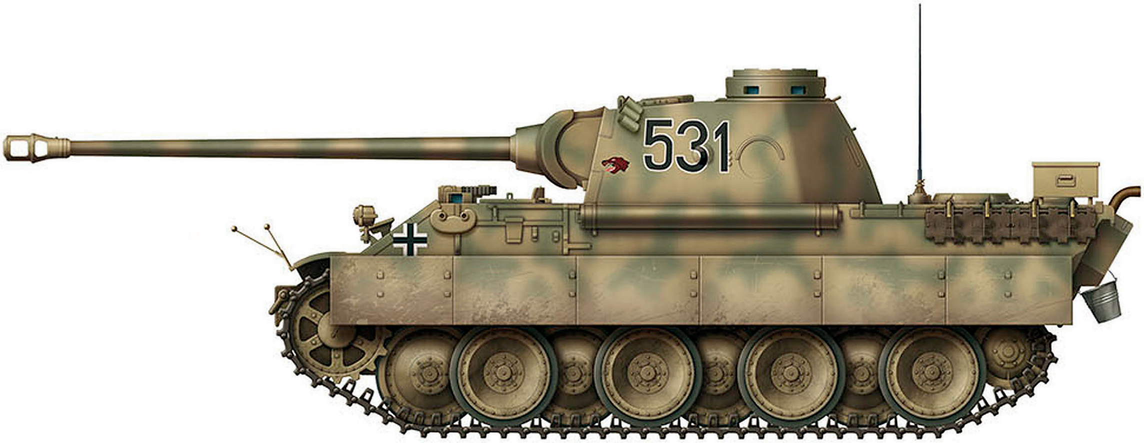
Panthers in 1943

Before Kursk the T-34 was numerically the most important enemy tank. A large number of T-34s were probably from the 1942 batches and had a two-man turret. In the course of the first half of 1943, the T-34 M1943 arrived on the scene with a larger three-man turret. This third man, the gunlayer, normal on German tanks, greatly relieved the commander from much of his burden.

Based on its technical and tactical data, the Panther was far superior to the tank that once gave the Germans such a fright, and could destroy the T-34



In the spring of 1943, the Russians developed a new turret for the T-34. It was better armoured and distinctly larger to provide room for a third crewman. During series production a cupola was fitted on the top of the turret. (Anderson)



A PzKpfw V Panther Ausf D from PzAbt 52 during the attack on Kursk. The vehicles left the factory painted with dark yellow undercoat, and it was left to individual units to apply their own 'style' of camouflage. (Anderson) at over 2,000m range even using the weaker PzGr 39 shell. In some cases success was achieved at 3,000m. Despite its impressive technical superiority, the Panther was susceptible on its flanks, and crews always had to be aware of this vulnerability

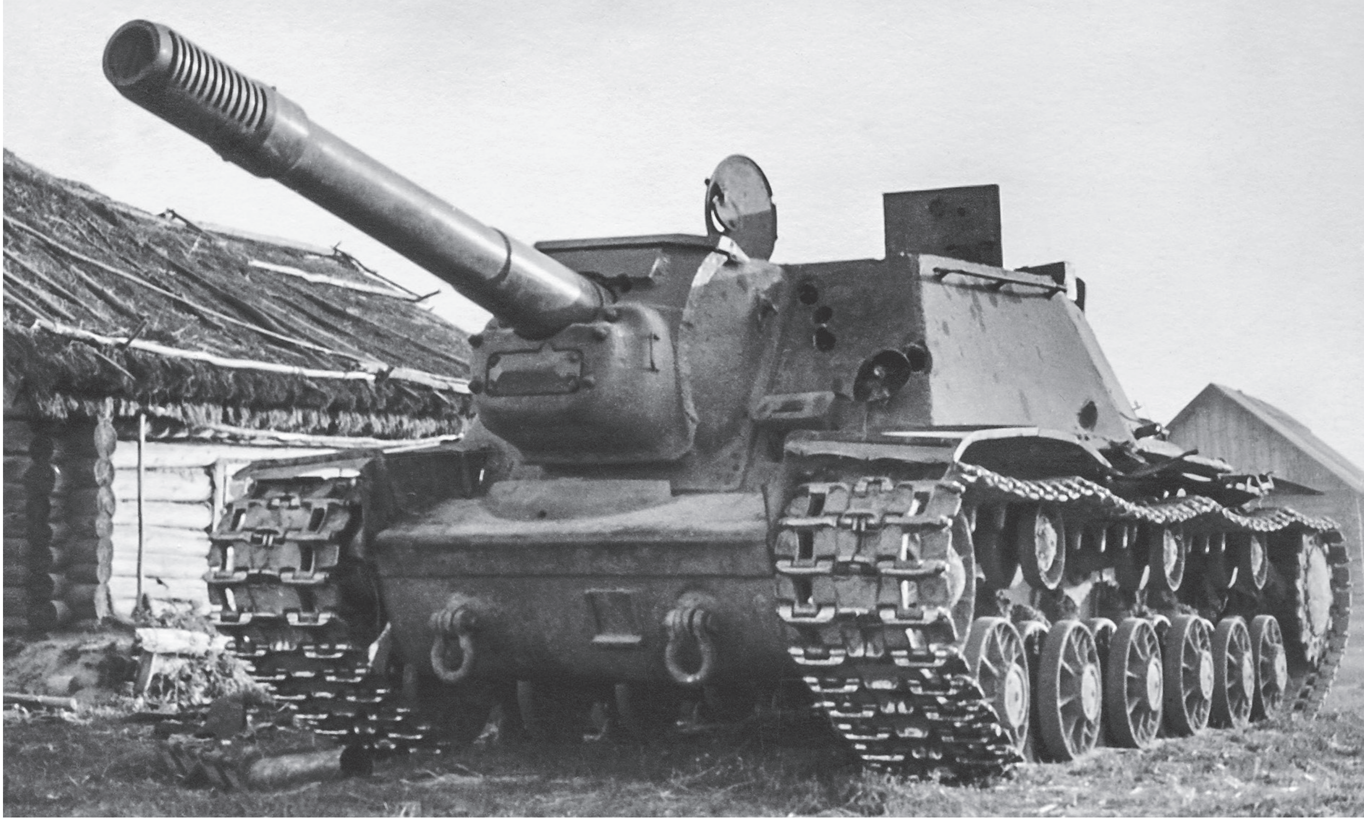
Improved Main Armament

The standard Russian tank gun to the end of the war was the 76.2mm ZiS-5 of the T-34 and KV-1. Compared to the 7.5cm KwK 40 L/48 of the PzKpfw IV, this gun was no match. This was due to the fact that German industry supplied much more efficient munitions. The hard-core (PzGr 40) shell in particular had very good penetration. Due to the shortfall in explosive filling, the destructive effect of Russian shells was weaker and limited to shrapnel. According to German reports it was not until the second half of 1943 that the Russians were using hard-core shells for the 7.62mm ZiS-5, but these were available only in small numbers and limited to usage in engagements against Panthers and Tigers. No more precise details are known.

The unsatisfactory performance of the ZiS-5 led initially to considerations of arming the T-34 and KV tanks with heavy calibre artillery guns as being suitable to take on the Tiger Ausf E. It proved impossible to mount these in the turret, so self-propelled assault guns were developed: the SU-122 with the 122mm D-25-44S field howitzer and the SU-152 using the 152mm ML-20S howitzer. These vehicles were used to provide artillery support in attacks, but their HE shells could also be dangerous if a hit was made on the superstructure or running gear of a Tiger Ausf E or a Ferdinand.

Panther v. T-34

	Panther	**T-34 M1943**
Armament	7.5cm KwK 42 L/70	76.2mm ZiS 5 L/41
Penetration armour at 500m	174mm	75mm
Penetration armour at 1,000m	150mm	67mm
Penetration armour at 2,000m	106mm	54mm
Crew	Five	Five
Battle weight	c.45t	28.5t
Engine	Petrol	Diesel
Output	700hp	500hp
Top speed	55kph	45kph
hp/weight ratio	15.55hp/t	17.5hp/t
Ground pressure	c.0.74kg/sqcm	c.0.66kg/sqcm
Range (roads)	200km	450km
Range (cross country)	100km	260km
Fording depth	1.9m	1.3m
Maximum armour frontal	80mm	45mm
Maximum armour side	40–50mm	45mm
Maximum armour rear	40mm	40mm



The SU-152 had to be developed in a hurry so that the Red Army could have a heavy self-propelled gun capable of defeating German heavy tanks. (Anderson)

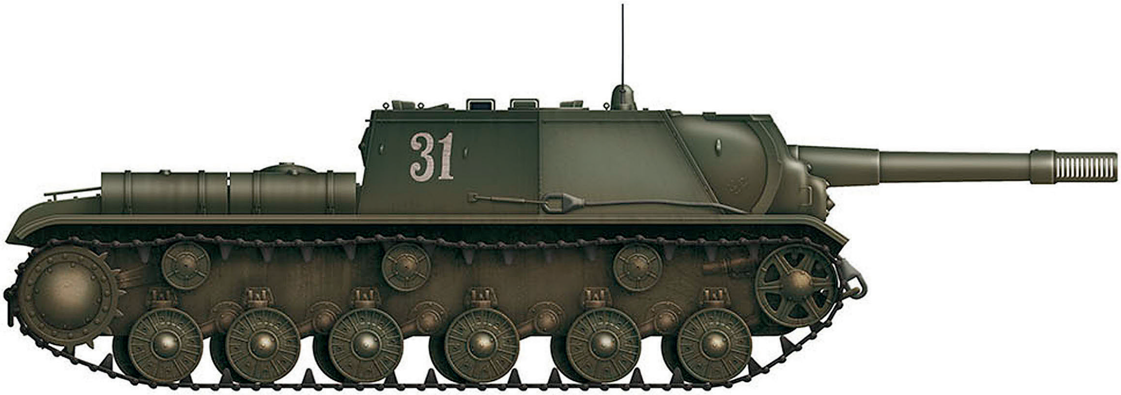
In 1943, parallel with these emergency solutions, a tank gun was developed from the 85mm anti-aircraft gun. At first the D-5T-85 was installed in the KV-1s – a lighter version of the KV – and designated KV-85. A relatively small number were produced.

Compared to the ZiS-5 this gun had better penetration but could not match the 7.5cm KwK 42 L/70 on the Panther or the even better 8.8cm KwK 43 L/71.

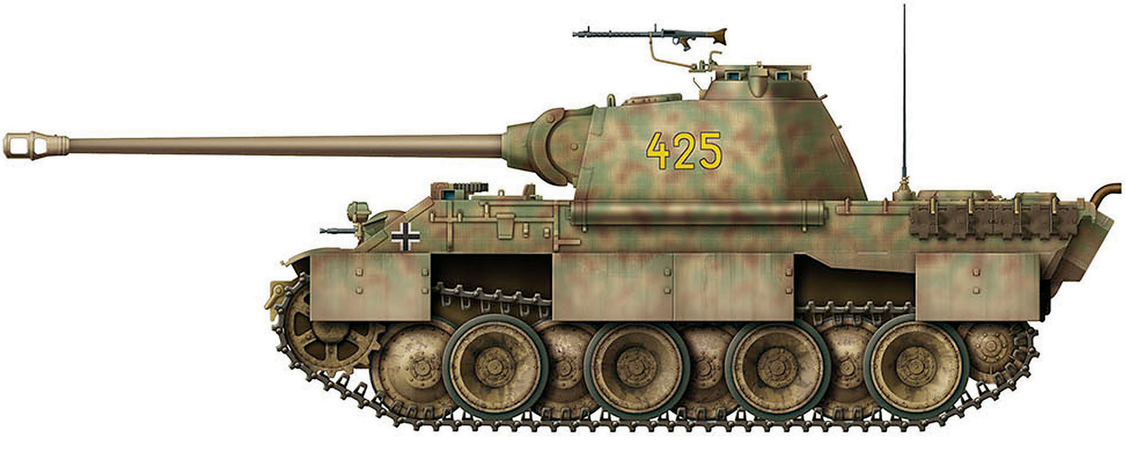
In the closing months of 1944, the T-34 (now designated T-34/76) was improved by mounting the 85mm D-5T-85 in a much larger turret similar to that of the KV-85. This new type was designated T-34/85 and was mass produced by at a number of sites in the Soviet Union.

Since they now had a medium tank with 85mm gun, there did not seem much point in continuing with the KV-85, and at the end of 1943 this heavy tank was improved by enlarging the hull and fitting the 122mm D-25 gun in the turret. The weapon was a high performance gun with a flat trajectory, but its HE shells could decisively damage a Panther or Tiger.

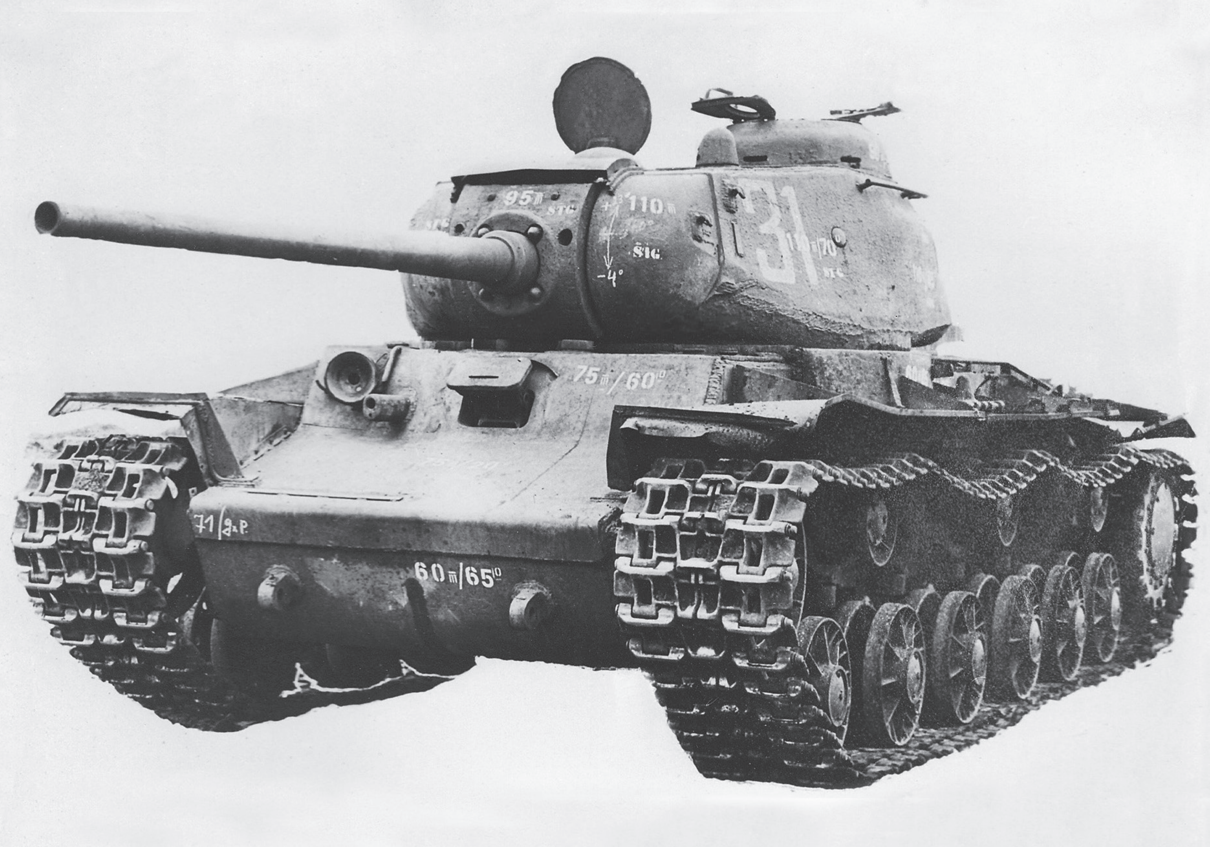
Limited by heavy armour, the JS-2 was slow and cumbersome. Many German reports state that the rate of fire was inadequate, hardly surprising considering that the ammunition was in two parts. All the same, both the T-34/85 and JS-2 proved clearly superior to the PzKpfw IV. In comparison with Panther and Tiger, however, the Soviets still had a long way to go to achieve parity.



Technically and mechanically the SU-152 was a simple solution: mount a 152mm ML-20S heavy field howitzer on a KV-1S. Finally, Soviet troops were armed with a weapon capable of inflicting damage to the latest German heavy armour. (Anderson)



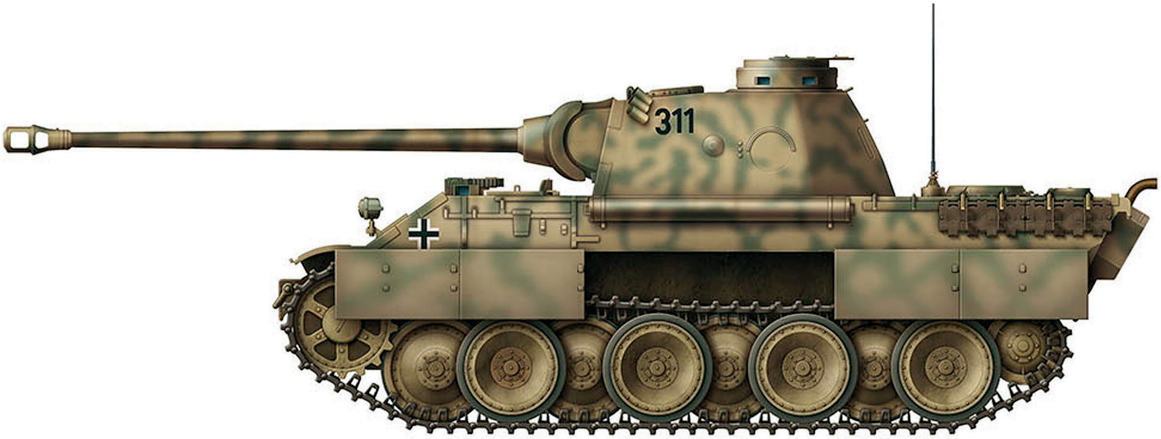
When the PzKpfw V Panther Ausf A entered production in 1943, it was fitted with an armoured ball-type mounting for the hull MG and a new improved turret. (Anderson)



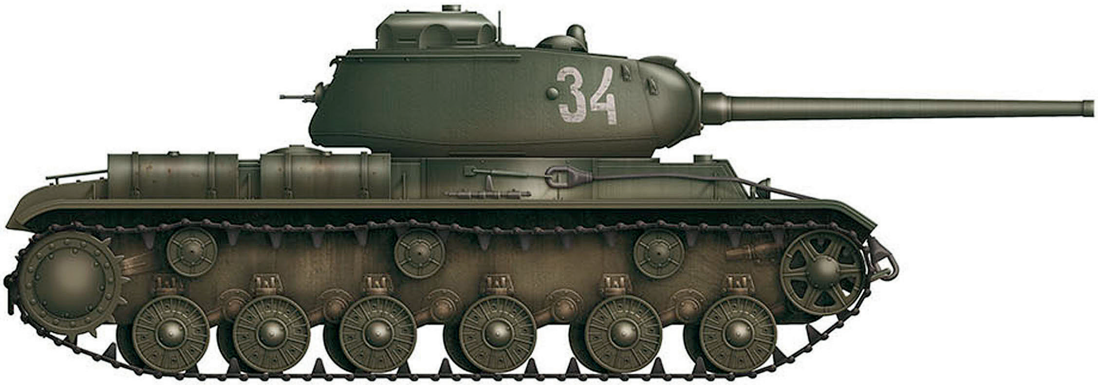
The KV-85 was the first Soviet battle tank to be fitted with the 85mm D-5T tank gun. In 1943 it was described in German circles as 'difficult to engage', as it was clearly superior to the PzKpfw IV and StuG assault gun. (Anderson)

Panther v. KV-85

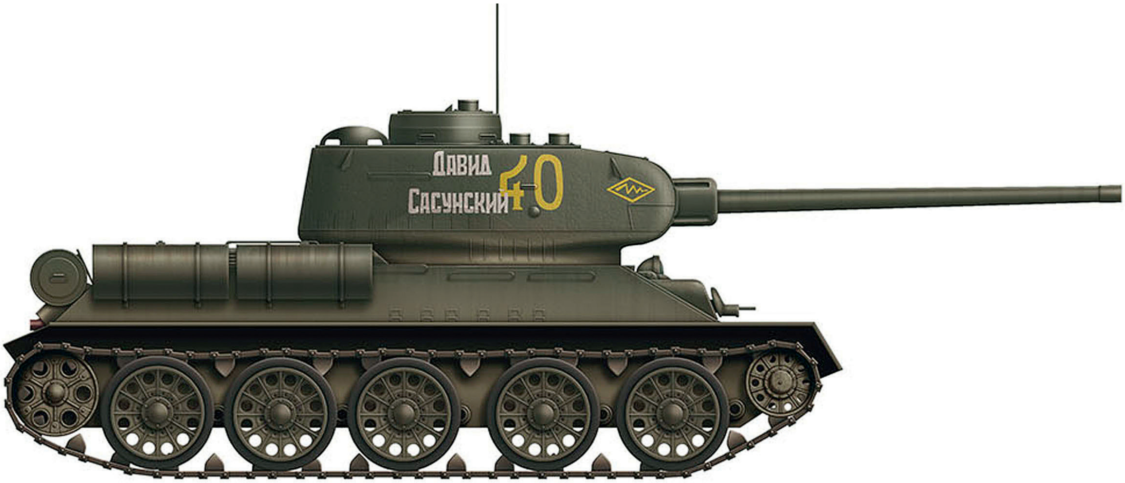
	Panther	**KV-85**
Armament	7.5cm KwK 42 L/70	85mm L/53 D-5T-85
Penetration armour at 500m	174mm	100mm
Penetration armour at 1,000m	150mm	80mm
Penetration armour at 2,000m	106mm	Not known
Crew	Five	Four
Battle weight	c.45t	c.46t
Engine	Petrol	Diesel
Output	700hp	600hp
Top speed	55km/hr	34kph
hp/weight ratio	15.55hp/t	13hp/t
Ground pressure	c.0.74kg/sqcm	c.0.80kg/sqcm
Range (roads)	200km	200km
Range (cross country)	100km	not known
Fording depth	1.9m	1.6m
Maximum armour frontal	80mm	77mm, turret 100mm
Maximum armour side	40–50mm	60mm, turret 100mm
Maximum armour rear	40mm	75mm, turret 100mm



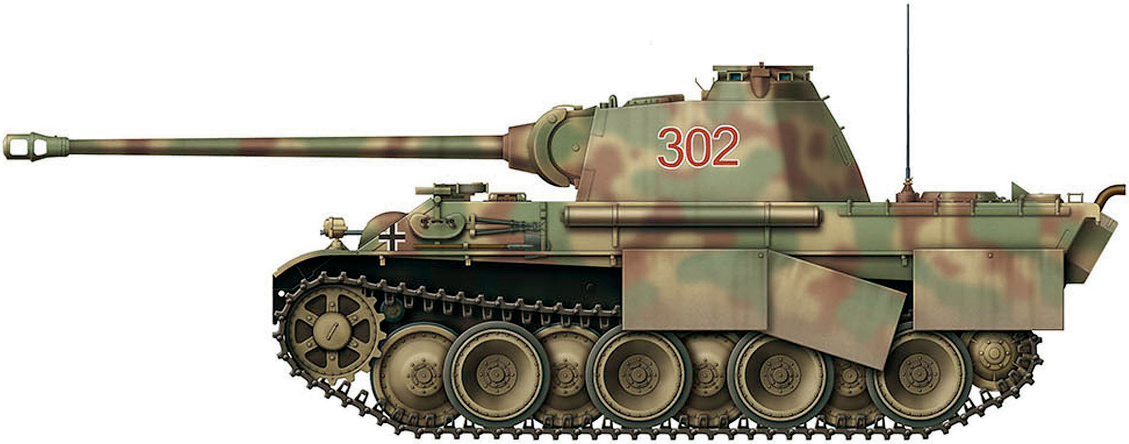
The PzKpfw V Panther Ausf D remained in service until the end of the war. The 7.5cm KwK 42 L/70 in the Panther was clearly superior at long range. But this was equalized by the short-range performance of the 85mm D-5T in the KV-85. (Anderson)



After the success of mounting the 85mm gun on the chassis of the KV heavy tank, Soviet engineers tried another improvement. In late 1943, a 122mm D-25 heavy field gun was mounted in an enlarged turret on a KV-85 chassis. While this was not a success, data gained from trials was used for the JS-2 main battle tank. (Anderson)



The T-34/85 was the best-performing version of this Soviet-designed and built tank. The 85mm ZiS-S-53 gun gave a distinct advantage over the PzKpfw IV and StuG assault gun, but it was not sufficiently powerful to penetrate the frontal armour of a Panther. But if a hit was achieved on the side of a Panther, even at medium range, the result would be fatal. (Anderson)

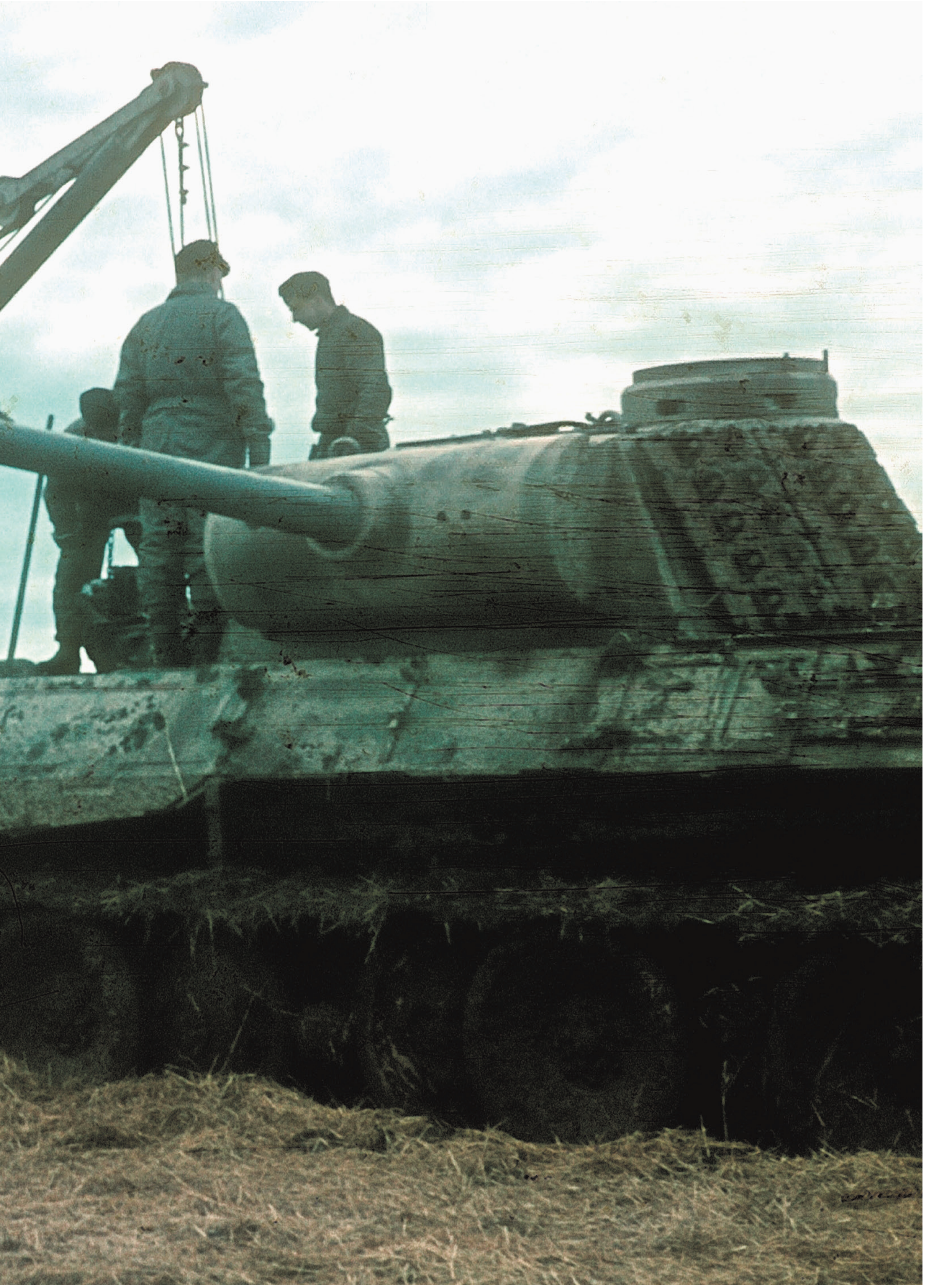


It had not been possible to make any fundamental improvements to the PzKpfw V Panther before the end of the war. Instead priority was given to rectifying the many minor problems experienced when the Ausf G first entered service. The Ausf F and Panther II had not progressed beyond the prototype stage. (Anderson)

The T34/85 was available in large numbers, but although the 85mm ZiS-S-53 gun was an improvement it was no match (in a front-on tank-versus-tank battle) to the 7.5cm KwK 42 L/70 mounted in a Panther. (Kolomiets)

Panther v. T-34/85

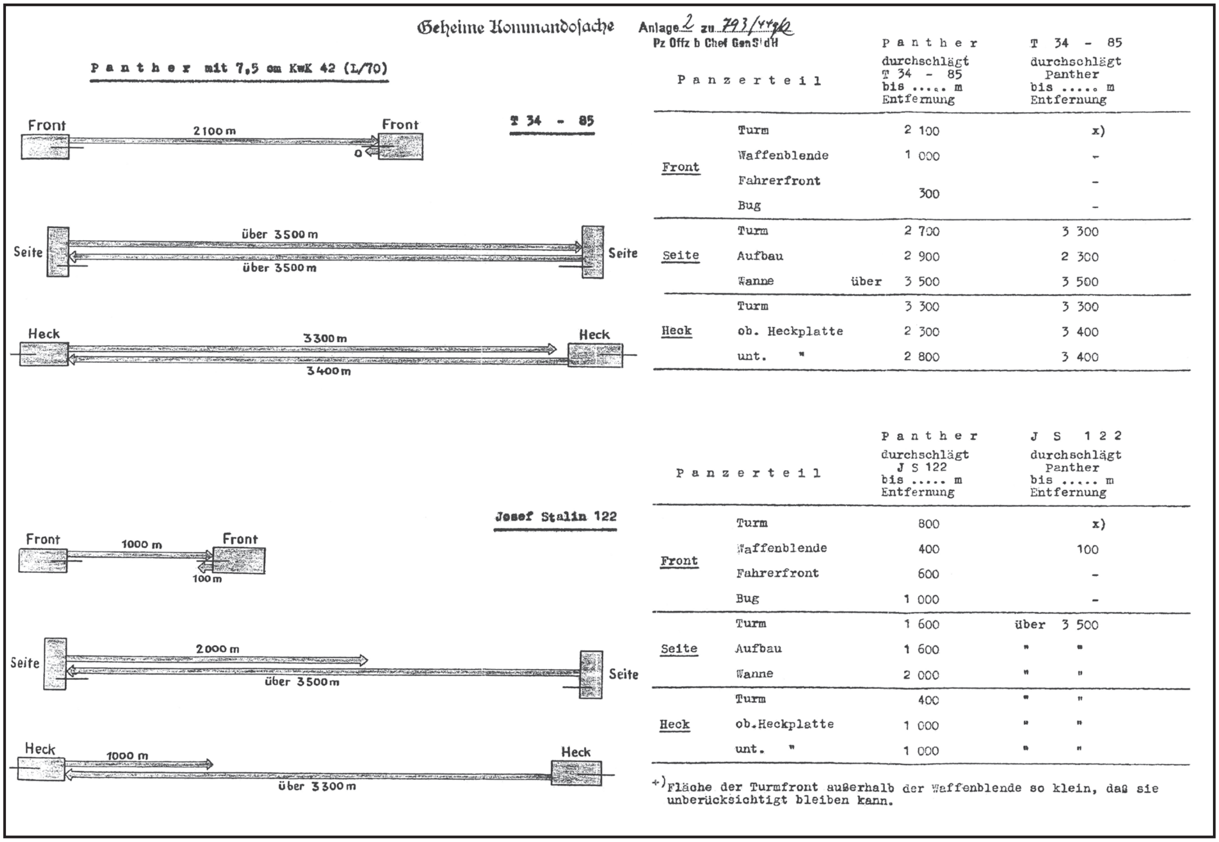
	Panther	**T-34 M1943**
Armament	7.5cm KwK 42 L/70	85mm D-5T-85 L/53
Penetration armour at 500m	174mm	100mm
Penetration armour at 1,000m	150mm	80mm
Penetration armour at 2,000m	106mm	not known
Crew	Five	Five
Battle weight	c.45t	30t
Engine	Petrol	Diesel
Output	700hp	500hp
Top speed	55kph	45kph
hp/weight ratio	15.55hp/t	16.7hp/t
Ground pressure	c.0.74kg/sqcm	c.0.87kg/sqcm
Range (roads)	200km	300km
Range (cross country)	100km	160km
Fording depth	1.9m	1.3m
Maximum armour frontal	80mm	45mm, turret 100mm
Maximum armour side	40–50mm	45mm, turret 100mm
Maximum armour rear	40mm	40mm, turret 100mm



Using the chassis and running gear of the 18-ton FAMO F2 half-track (SdKfz9), the *Wehrmacht* specified the F3 recovery vehicles primarily for tank recovery duties. Two types were built, one with a 6-ton capacity manually operated crane (SdKfz9/1), the other using a 10-ton capacity petrol-electric powered crane (SdKfz9/2). (Panzerfoto)

Panther v. JS-2 (German measurements by WaPrüf 6)

	Panther	JS-2
Armament	7.5cm KwK 42 L/70	120mm D-25 L/45
Penetration armour at 500m	174m	125m
Penetration armour at 1,000m	150m	120m
Penetration armour at 2,000m	106m	100m
Crew	Five	Four
Battle weight	c.45t	46t
Engine	Petrol	Diesel
Output	700hp	520hp
Top speed	55kph	37kph
hp/weight ratio	15.55hp/t	11.3hp/t
Ground pressure	c.0.74kg/sqcm	c.0.82kg/sqcm
Range (roads)	200km	240km
Range (cross country)	100km	210km
Fording depth	1.9m	1.3m
Maximum armour frontal	80mm	100mm, turret 100mm
Maximum armour side	40–50mm	90mm, turret 90mm
Maximum armour rear	40mm	60mm, turret 90mm



This realistic assessment made by the German general staff shows the superiority and inferiority of the Panther against the T34/85 and JS-2. (NARA)

Geheime Kommandosache

Anlage 2 zu 793/44gk
Pz Offz b Chef GenStdH

Panther mit 7,5 cm KwK 42 (L/70)

T 34 - 85

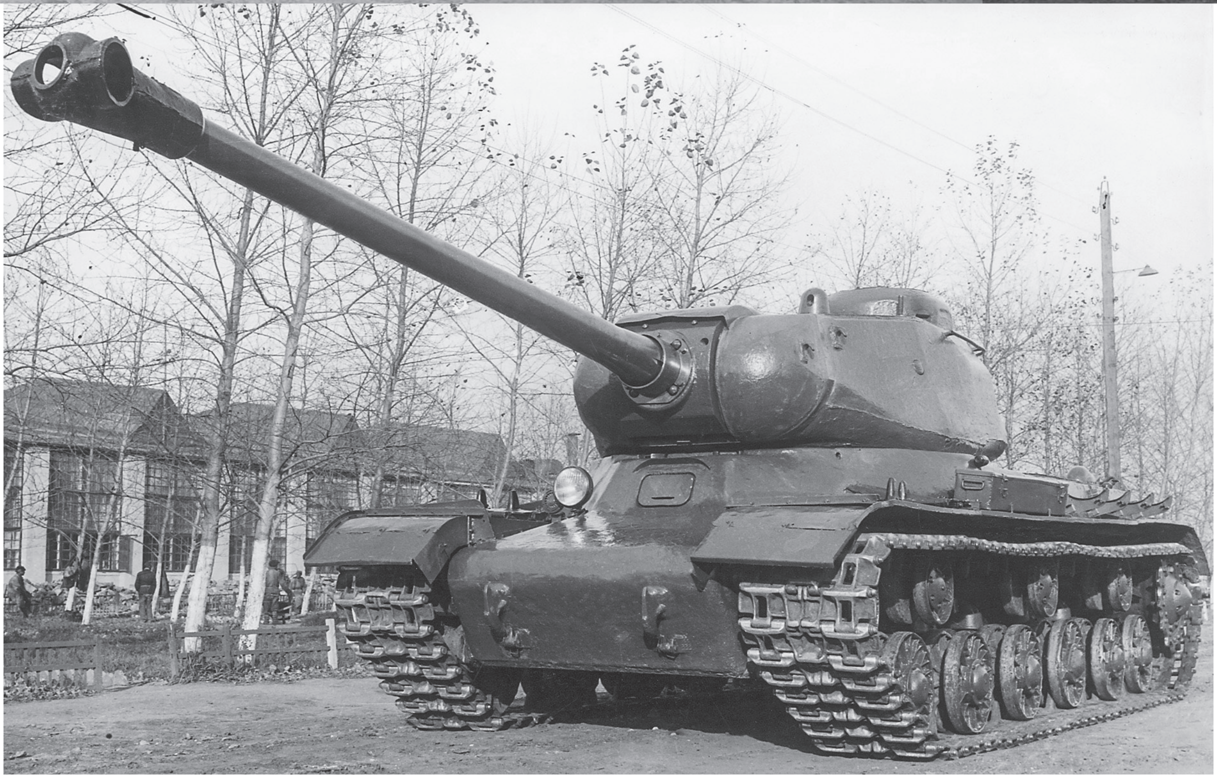
Front
2100 m
Front
0
Seite
über 3500 m
über 3500 m
Seite
Heck
3300 m
3400 m
Heck

Panzerteil		Panther durchschlägt T 34 - 85 bis ..... m Entfernung	T 34 - 85 durchschlägt Panther bis ..... m Entfernung
Front	Turm	2 100	x)
	Waffenblende	1 000	-
	Fahrerfront	300	-
	Bug		-
Seite	Turm	2 700	3 300
	Aufbau	2 900	2 300
	Wanne	über 3 500	3 500
Heck	Turm	3 300	3 300
	ob. Heckplatte	2 300	3 400
	unt. "	2 800	3 400

Josef Stalin 122

Panzerteil		Panther durchschlägt J S 122 bis ..... m Entfernung	J S 122 durchschlägt Panther bis ..... m Entfernung
Front	Turm	800	x)
	Waffenblende	400	100
	Fahrerfront	600	-
	Bug	1 000	-
Seite	Turm	1 600	über 3 500
	Aufbau	1 600	" "
	Wanne	2 000	" "
Heck	Turm	400	" "
	ob.Heckplatte	1 000	" "
	unt. "	1 000	" "

+) Fläche der Turmfront außerhalb der Waffenblende so klein, daß sie unberücksichtigt bleiben kann.



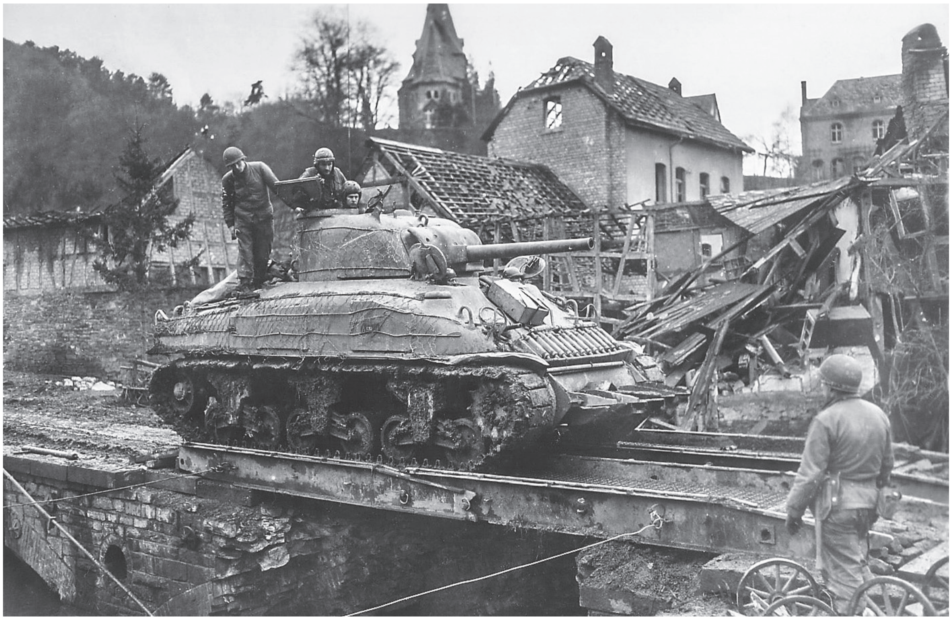
A pre-series Josef Stalin (JS)-2, often called J-122 by the Germans. Although the type had a thicker cast steel hull and turret, it was actually lighter than a KV. This was due to the designers carefully identifying where strong points in the armour were to be placed. The type mounted a powerful 122mm D-25T gun fitted with a single-chamber muzzle brake. (Anderson)

Allied Forces

After Dunkirk, the development of an effective tank for British armoured forces was given low priority. During the fighting in the deserts of North Africa, British-built tanks failed to defeat superior German armour, but when Allied forces landed in Algeria, equipped with modern US-built tanks the situation improved.

Within a short period the US had developed the M3 General Lee/Grant medium tank, fitted with a 75mm gun mounted in a casemate on the right-hand side of the hull. Because of the very limited traverse this was an unsatisfactory solution. A turret on the superstructure mounted a 37mm gun which enabled all-round fire. The M3 was of riveted construction and was produced as an interim measure, but more than 6,000 were produced. The US delivered 1,200 to the Soviets under the Lend-Lease Program and another 2,900 to the British. Despite its many design faults it proved to be reliable and useful asset. For the first time British troops in the desert had a tank able to engage German armour at longer ranges and also fire HE ammunition. The British QF 6-pounder gun became available from mid-1942, but the small calibre (57mm) was believed ineffective at the time of its introduction.

In a 1942 the M4 medium tank was built using the basic hull of an M3. It carried, as demanded, a 75mm gun in a large turret and had much better armour than its predecessor. The M4 Sherman was also delivered in various versions to Great Britain and the Soviet Union. The Sherman was more than an equal match for the PzKpfw IV despite it having smaller calibre main gun.



An M4A1 in Normandy after the D-Day landings. It has been fitted with a ‘Culin Cutter’ hedge-breaking device to rip through the dense undergrowth (Bocage) found in that region of France. Tanks with the cutter were first known as ‘Rhinoceros’, later shortened to ‘Rhino’. (NARA)

In Italy the Sherman proved more able to handle the mountain terrain where German tanks on the other hand, especially the heavier types, encountered mechanical problems. The robust structure of the M4 Sherman compensated for its weaker armament and armour when compared to German tanks. Also the US armaments was manufacturing tanks at a rapid rate and any tanks lost in battle were quickly replaced.

From 1943, the M4 Sherman was the most numerous battle tank in service with US and British forces, supplied in vast numbers by a highly-efficient US armaments industry. There were problems with the suspension or armour, but they were knowingly accepted by tank crews.

In 1944 improvements were introduced during production, particularly in regard to the hitting power of the main armament. By the summer, the M4 Sherman was still fitted with the 75mm gun which had little effect on the well-armoured German tanks at the normal fighting range of 1,000m. In mid-1944, a new 76mm gun with much improved performance entered service and from then on all production tanks were so fitted.

The M4 was originally fitted with type simplest suspension: Vertical Volute Suspension System (VVSS) system which was used until mid-1944. When the combat weight increased Horizontal Volute Suspension System (HVSS) was fitted, which was a significant improvement. A new, broader track helped reduce ground pressure and provided much better cross-country mobility.

New Weapons, New Tanks

As regards its effectiveness, the US tank army was very limited until the end of 1944 by the then-current ‘Tank Destroyer Doctrine’ which dictated that

Panther v. M4 Sherman

	Panther	**M4 Sherman**
Armament	7.5cm KwK 42 L/70	75mm Gun M3 L/40
Penetration armour at 500m	174mm	76mm
Penetration armour at 1,000m	150mm	63mm
Penetration armour at 2,000m	106mm	43mm
Crew	Five	Five
Battle weight	c.45t	30t
Engine	Petrol	Petrol
Output	700hp	400hp
Top speed	55kph	43kph
hp/weight ratio	15.55hp/t	13.3hp/t
Ground pressure	c.0.74kg/sqcm	c.0.82kg/sqcm
Range (roads)	200km	200km
Range (cross country)	100km	not known
Fording depth	1.9m	1m
Maximum armour frontal	80mm	45mm, turret 76mm
Maximum armour side	40–50mm	45mm, turret 50mm
Maximum armour rear	40mm	40mm, turret 50mm

enemy tanks were to be engaged by anti-tank units operating the M-36 armed with a 90mm gun. Despite all the arguments, the installation of this effective gun into battle tanks continued to be refused.

In 1944 it was recognized that even the tank crews needed suitable weaponry in order to combat the heavier German tanks. The 'Tank Destroyer Doctrine' was critically re-examined and altered. At first the M4 Sherman was fitted with a low-trajectory 76mm gun close in performance to the 7.5cm KwK 42 L/70: now German tanks could be fought with some prospect of success. The 76mm M4A3 HVSS soon followed which had better armour and the improved type of running gear, but the turret was too small to mount the 90mm.

As a result, in 1945 the M-26 Pershing entered service with the US Army and at last it had a truly modern tank. The type featured a cast steel hull and turret, torsion bar suspension, and to save space the engine and transmission were fitted in the rear of the hull. The M-26 mounted the powerful 90mm Gun M3 in a roomy turret, and had an overall low profile.

A direct comparison with the Panther and Tiger Ausf B is difficult to make. Because of the lack of suitable engines, the Ford 500hp GAF used in the M4A3 (HVSS), already proven to be lacking sufficient power, was installed and this resulted in the M-26 having poor cross-country mobility. After the war the M-26 received a more powerful engine, and evolved into the M-46 Patton.

British Developments

From 1943 the British also urgently needed a powerful medium tank. Due to many other war priorities and a lack of capacity, the design and manufacture of

The 76mm Gun M1 at last provided the crews of M4 Sherman with the means to fight the Panther and Tiger with some chance of success. (NARA)

a suitable tank was not possible in the short term, and therefore it was decided to procure the US-built M4 Sherman. More than 17,000 M4s were supplied through the Lend-Lease Program, almost a third of the total production.

Earlier British-designed tanks were still armed with a 57mm gun. The British military replaced them initially with a 75mm gun and these were fitted in various tanks from mid-1944. Its penetrative power was not satisfactory and therefore a 76.2mm high-performance tank gun was developed, the 17-pounder QF gun. Because of it size, this outstanding gun could not be installed on current British tanks, whereas the M4 was suitable. More than 2,000 were successfully converted to receive the powerful gun.

At the same time the British were pressing ahead with their own developments. The Cruiser method of construction seemed to have the best possibilities. In 1944, the Cruiser tank Mk VIII Cromwell was built as a medium tank. The running gear was considered impressive: it was fast and manoeuvrable, and armed with a 75mm gun it could engage even the modern German tanks under certain circumstances.

Not until the Cruiser tank A34 Comet entered service did the British Army have a modern medium battle tank. It was very manoeuvrable and armed with a very effective 77mm gun. The cruiser-concept was further developed after the war and this resulted in the truly excellent Centurion.

Panther: an Evaluation

The three principles behind the tank system – firepower, mobility, armour – were to the fore not only before, but much more obviously during World War II.

The Panther medium tank was developed by the Germans from 1942 as a direct response to the Soviet T-34, then the best tank in the world. In the subsequent war years, a series of new tanks was produced for the Allied armies in response to the perceived threat of the Panther. In this context did the Panther maintain its lead over all others?

Firepower

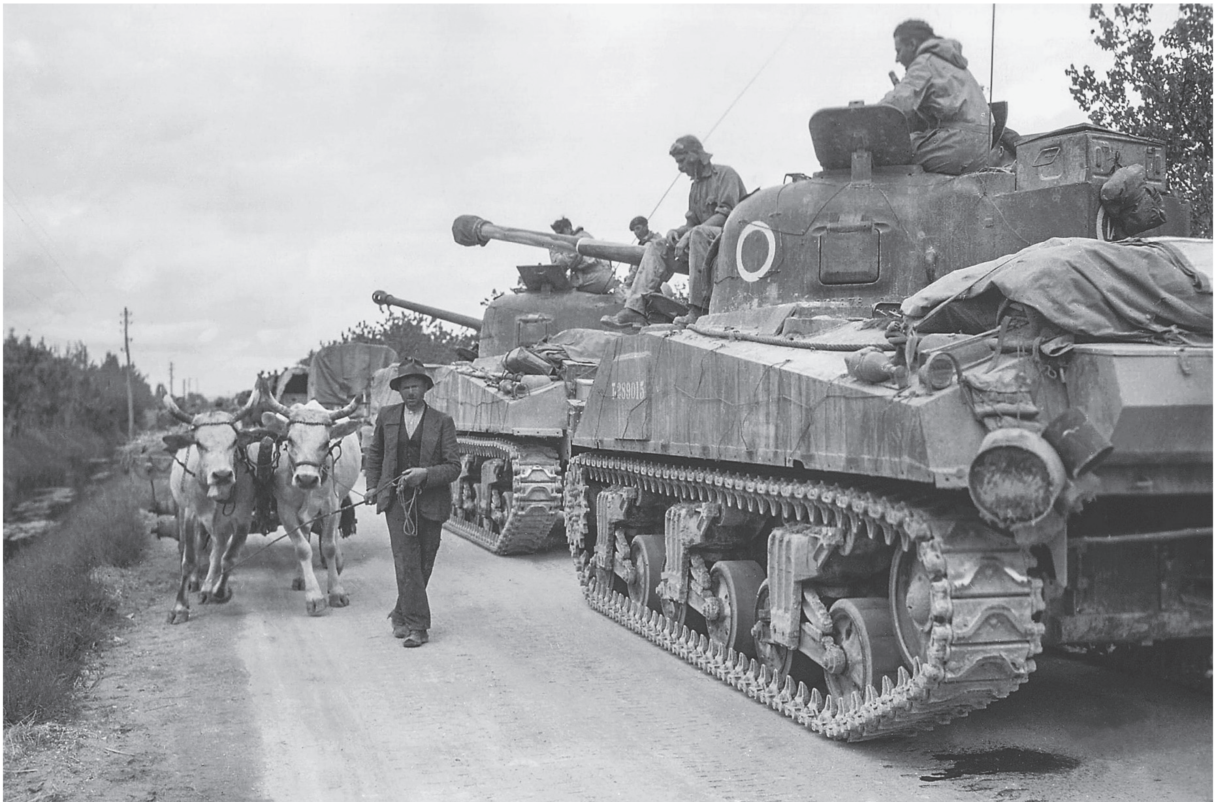
The high-performance weapon of the Panther, the 7.5cm KwK 42 L/72, had first proven its performance against Soviet tanks and continued to do so against most Allied tanks until the end of the war.

The Panther turret was turned by an oil-pressure gearing from the running engine. A full revolution required 30 to 35sec. In comparison to the T-34 (electric motor, 10sec) and the Sherman (electrically driven oil-pressure drive, 15sec) this was a clear disadvantage in all battle situations.

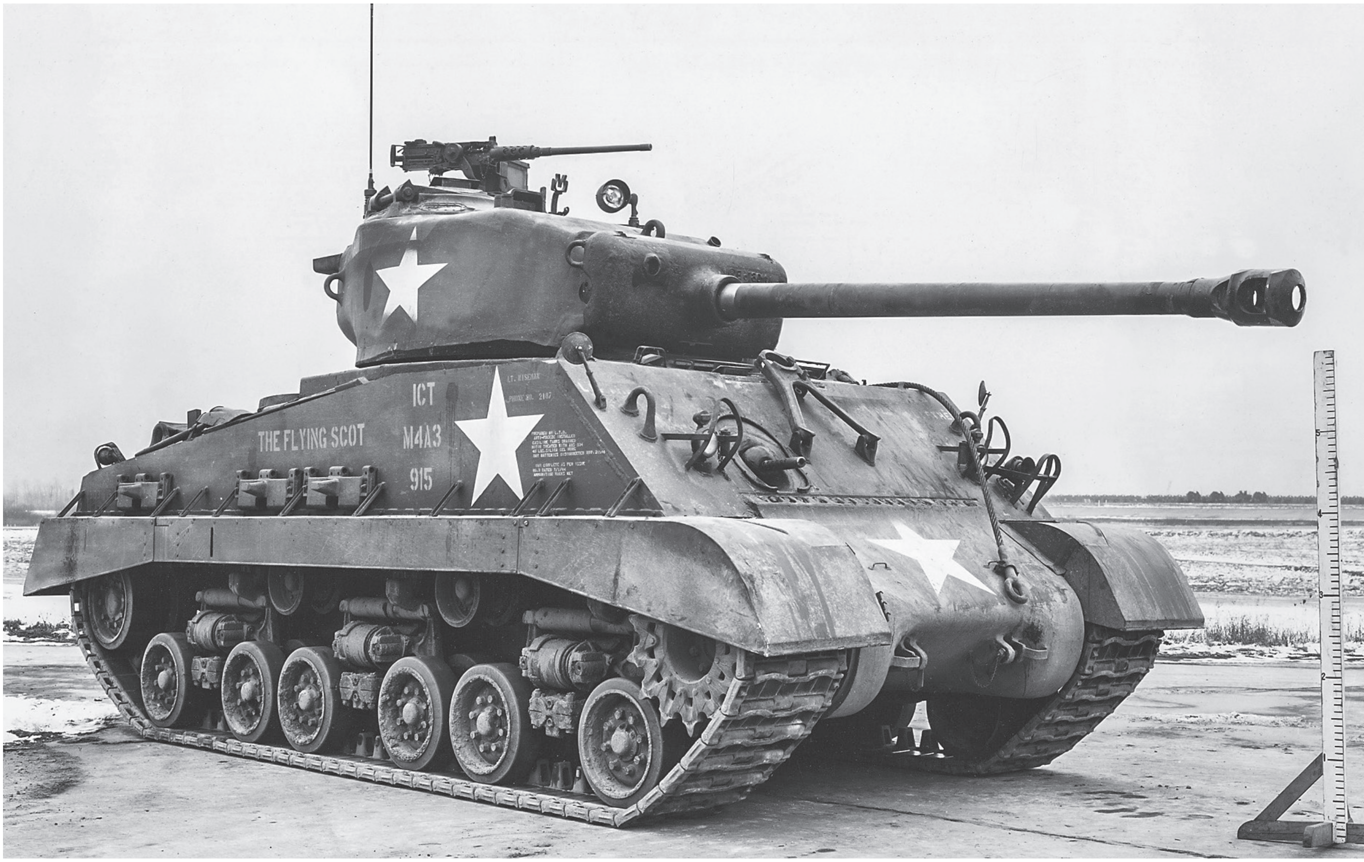
The torsion bar suspension allowed smooth running providing ideal conditions for a gunlayer to have the advantage of stabilized optics – allowing a rapid 'stop-shoot-move' technique – but it was never fitted to a Panther. However, the US Army fitted that type of stabilizer successfully to its M4 medium and M5 light tanks.

Mobility

The original specifications for the Panther were for it to be a 30-ton class tank, but production vehicles were much heavier at 45t. Nevertheless, the Panther had good running qualities and excellent cross-country mobility. According to



The British military decided to mount the Ordnance Quick-Firing (QF) 17-pounder anti-tank gun in the Sherman – mainly M4A4 (Sherman V). Known as the 'Firefly' in the British army it was possibly the best (most powerful) of the M4 series tanks. The type was first deployed in Italy at the end of 1944. (NARA)



The M4 Sherman reached the pinnacle of development in the M4A3 (76) HVSS. It was fitted with a more powerful 500hp Ford GAA V-8 engine and Horizontal Volute Suspension System (HVSS), which gave an improvement in speed and mobility. (NARA)

Panther v. M4A3 (76) HVSS Sherman

	Panther	M4A3 (76) HVSS Sherman
Armament	7.5cm KwK 42 L/70	76mm Gun M1 L/55
Penetration armour at 500m	177mm	157mm
Penetration armour at 1,000m	150mm	116mm
Penetration armour at 2,000m	106mm	98mm
Crew	Five	Five
Battle weight	c.45t	33.7t
Engine	Petrol	Petrol
Output	700hp	500hp
Top speed	55kph	43kph
hp/weight ratio	15.55hp/t	14.8hp/t
Ground pressure	c.0.74kg/sqcm	c.0.77kg/sqcm
Range (roads)	200km	160km
Range (cross country)	100km	not known
Fording depth	1.9m	91cm
Maximum armour frontal	80mm	50-100mm, turret 63-90mm
Maximum armour side	40–50mm	40mm, turret 50mm
Maximum armour rear	40mm	40mm, turret 50mm

official German documentation, the Panther had a range of 200km, the M4A4 Sherman was 130km, and the T-34 was 450km (up to 700km with external tanks). The outstanding running gear set new parameters, and according to various sources the level of vibration suppression was not achieved until the Leopard 2 entered service in the 1970s.

Armour

The Panther had very substantial frontal protection – the armour was 80mm and considerably sloped, and was only vulnerable to the Soviet 85mm, the US 90mm Gun M3 and the British 17-pounder QF at relatively short range. If the attack was made against the side or rear, then the Panther was vulnerable at medium range and could be knocked out at close range.

As Main Battle Tank

Initially it was planned for the Panther to replace the PzKpfw III on the production lines. It was also planned that it would replace the PzKpfw IV as a main battle tank in 1944. By reason of insufficient manufacturing capacity, the Panther could never be produced in the numbers required. The PzKpfw IV, developed around 1935, remained in production until the end of the war. A total of 8,500 were built. Final production figures for all models of Panther was 6,000.

The difficult situation in the armaments industry did not deter those responsible to constantly attempt to further develop the Panther concept. During 1943, a Panther II was conceived and partially developed. As a result the armament (presumably 8.8cm) and armour (frontal 100mm, sides 60mm) all-up vehicle weight would have been raised considerably. The battle weight of the tank would certainly have exceeded 50t, which would presumably have affected cross-country mobility. The Panther II project was abandoned in 1943.

- A series of pioneering increases to battle worthiness were either under development or due to be introduced shortly into the series runs. These included infra-red sighting equipment which would have given the Panther a certain capability to fight at night.
- An automatic loader would have increased the rate of fire and in certain cases even the need for a gunloader.
- A stabilizer for the 7.5cm KwK 42 L/70 was under development.
- The Maybach engine was to have been replaced by a greatly improved and more powerful unit. Even an air-cooled diesel was under discussion.

None of these improvements entered into series production.

After abandoning the development of the Panther II, standardized tanks designated E-50, E-75 and E-100 (the number indicating the battle weight) were developed. With the exception of the E-100 hull, none of these were ever built. The lack of production capacity was the reason for the lack of progress.

Panther v. M-26 Pershing

	Panther	**M26 Pershing**
Armament	7.5cm KwK 42 L/70	90mm Gun M3
Penetration armour at 500m	174mm	not known
Penetration armour at 1,000m	150mm	195mm
Penetration armour at 2,000m	106mm	150mm
Crew	Five	Five
Battle weight	c.45t	42t
Engine	Petrol	Petrol
Output	700hp	500hp
Top speed	55kph	32kph
hp/weight ratio	15.55hp/t	11.9hp/t
Ground pressure	c.0.74kg/sqcm	not known
Range (roads)	200km	150km
Range (cross country)	100km	not known
Fording depth	1.9m	1.22m
Maximum armour frontal	80mm	100mm
Maximum armour side	40–50mm	51mm, turret 76mm
Maximum armour rear	40mm	50mm, turret 76mm

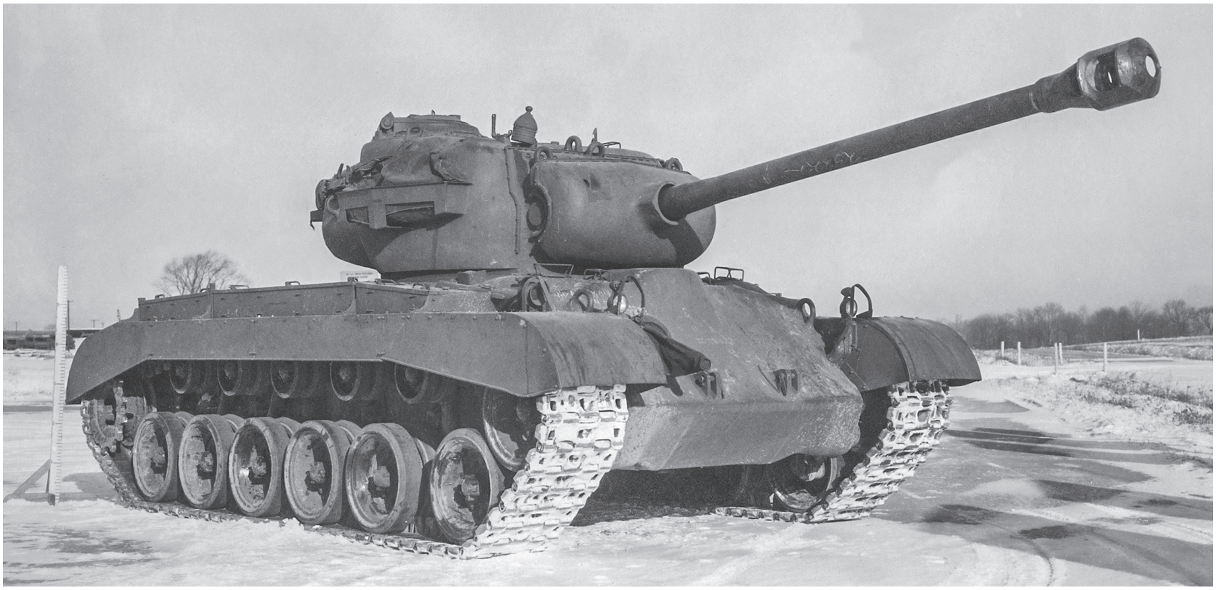
On 14 March 1945 the tempo was raised again. The problem of fitting the 8.8cm KwK 43 L/71 into the turret of the Panther seemed to have been overcome. The Inspector-General of Panzer Troops demanded:

> One experimental Panther with 8.8cm KwK 43 L/71 as per the wooden mock-up with combined turret ‘Panther narrow/enlarged turning circle’ displayed at Daimler-Benz on 12 December 1944. The GenInsp PzTrp is agreed on the superstructure differing from the series run and having the turret in mild steel mounted on an orthodox hull. He requests the earliest possible readiness of the test vehicle using every available means and no effort whatsoever is to be spared.

Shortly afterwards a collection of the ‘Development Trends’ was discussed by Guderian’s service centre. With regard to the Panther it was determined:

> 3.) Panther
> In the opinion of the Inspector-General of the *Panzertruppen* the situation at the present time… 75 Panthers, even incorporating the most modern and most fully developed design, are by no means more valuable than 150 PzKpfw IV lang despite all the weaknesses of that vehicle… New basis for judgement has arisen from the totally successful experiment at *Waffenamt* A (Army Weapons Office, A) fitting the Panther with the 8.8cm KwK 433 L/71 (Tiger II gun). 15 rounds to hand in the turret, about 50–54 in the hull. Rangefinder under armour, stabilized field of vision, otherwise corresponding to Panther narrow (turret). Weight around 1,000kg heavier.

The imminent defeat of Germany prevented this prototype from being built. An evaluation of its theoretical capabilities is therefore irrelevant.



The T26 (later M26 Pershing) was designed to fight the PzKpfw V Panther and PzKpfw VI Tiger Ausf E. Originally fitted with HVSS (as used on the M4A3), all production vehicles had torsion bar suspension. The tank was armed with a 90mm Gun M3 and powered by a 450–500hp Ford GAF V-8 engine. (NARA)

Basically it shows that the pure comparison of technical data is not sufficient. Tanks and tank units do not move about the battlefield in isolation. Artillery and fighter-bombers were used to support a tank assault, infantry and grenadiers were dependent on the penetrative power and dominance of the tank.

These considerations should taken into account when scrutinizing the larger picture. The outcome of the war was decided by the industrial might which gave the Soviets and Allies the ability to produce the vast amounts of equipment required to wage a global war, and the final encirclement of the Reich from three sides from 1943/44 onwards. The increasingly fast loss of the initiative and strategic capability to react made all offensive ambitions of the *Wehrmacht* impossible. Forced to defend, this meant that the *Panzerwaffe* with its effective Panther and Tiger II ultimately the lost the tactical and operational advantage.

Here we see a certain irony of history. The great successes of the *Panzerwaffe*, the conquest of Western Europe, and large areas of the Soviet Union, were all achieved with tanks of rather average quality. From 1943 when they had clearly superior weapons such as the Panther and Tiger, the era of German military expansion had ended. Despite theoretically improved striking power, offensive operations belonged in the past.

To what extent the Panther with its undeniable quality influenced post-war tank design is difficult to judge. Even if its capabilities were acknowledged, elsewhere each nation went its own way to reach or exceed the parameters. Defeat brought an abrupt end to German tank production. When a new West German tank, the Leopard, entered series production barely 20 years later, it had the engine and transmission in the rear, running gear with a taut tracks and a cast steel turret. It bore a resemblance to modern developments from the US armaments industry. The only thing left to remind us of the PzKpfw V Panther was that the Leopard had a higher level of mobility.

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A PzKpfw V Panther, one of a number of German vehicles abandoned after Soviet forces captured the town of Uman, in central Ukraine, on 10 March 1944. (Getty)

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A formation of PzKpfw V Panthers and a PzKpfw III advance across the snow-covered terrain of the Ukraine in December 1944. The photograph has been taken from the turret escape hatch of another Panther. (Getty)

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I would like to draw the reader's attention to the following publications and websites, which deal primarily with the technical aspects of the PzKpfw V Panther:

Thomas L.Jentz: *Der Panther*, Podzun-Pallas 1997, *Die deutsche Panzertruppe*, Podzun-Pallas 1999.

Frank Köhler: *Panther, Meilenstein der Panzertechnik*, Schneider Armour Research, 2014.

Panther 1944 Website: http://www.panther1944.de/index.php/de/

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A PzKpfw V Panther Ausf G abandoned by its crew during 'The Battle of the Bulge', the attempted German breakthrough in the Ardennes (19 December 1944 to 9 January 1945). (NARA)